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GAS JOURNAL

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[Founded in 1849 as the "Journal of Gas Lighting."]

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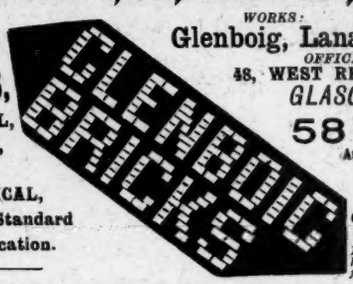

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EDITORIAL NOTES.

A Little Light Desirable from the Board of Trade.

WE know that the Board of Trade has had its hands pretty full; and still has, particularly with the interminable and complicated coal business. At the same time, the process of devolution has removed from it the burdens attaching to railways and transport, and electrical matters are following suit. In piloting the Electricity Bill through Parliament, the Home Secretary (Mr. Shortt) has been relieving the President of the Board of Trade. So that, had things remained as they were, and the Board had had full responsibility for these matters, they would simply have been overwhelmed. No one, of course, expects the Board to do the impossible; and we are sure that in making a suggestion it will not be taken by anyone in the Department that there is any desire on our part to harass. But the gas industry is not a small affair. It has an important place and part in the general system of the country; and the ramifications of its service are great. Notwithstanding, uncertainty to-day broods over it as to the exact lines of legislation that is to be promoted for it by the Board. It is known pretty well from what has been done in connection with the Board of Fuel Research report what will be the nature of the proposals to be made in the Bill in regard to future working and charging on the heat unit basis, and the auxiliary regulations as to inerts and pressure. But it is a great pity some indication is not given immediately as to the lines that will be taken in regard to the revision of standard and maximum prices and dividends. We know there is some reticence in doing this before a Bill which is a Government measure is introduced into Parliament. At the same time, if the Board could in some way disclose generally their intentions, we are sure there would be gratification in the industry, and a great saving of time and of preparation by those promoters of Private Bills who, through the Parliamentary Notices, have shown that they are proposing to deal in their Bills with the matters in question. These promoters, we have no hesitation in saying, are fully persuaded that, with a public measure in the field legislating upon the same matters, their own Bills will be hung-up. But there are the present indefiniteness and uncertainty; and we have not the slightest doubt that, if the conditions were reversed, and the promoters of the Private Bills referred to were satisfied that the proposals of the Board were consistent with the position and with justice to the old investors in the industry, their Bills would at once present a somewhat different complexion from what they will do if obscurity continues. The hint is thrown out to the Board in all sincerity, because we believe that (while fully recognizing the care that will have to be taken in framing the Bill) such disclosure as could be made would tend to remove the rough places in what is otherwise a smooth path. With the exceptions of which the Board are now fully cognizant, the whole of the remainder of the gas industry has shown a firm belief in the Board working for justice for gas undertakings. There are only a few breaches in a great unanimity. We should like to see these breaches filled in, and, backing the endeavours of the Board, a perfectly unanimous industry. The Board we believe have the power to bring this about.

Coal and Gas Prices Reduction.

NOTHING has yet transpired as to whether or not anything in the nature of regulations will be forthcoming from the Board of Trade in regard to the reduction of the price of gas in respect of the 10s. deduction from the standard price of coal used in the production of gas for "domestic and household" purposes, one of which descriptive terms could well be sacrificed in the interests of brevity. But the President of the Board fully realizes that it was quite impossible for the price of gas to be lowered until the meter indices are taken at the end of the quarter. He also recognizes that there cannot be an equal reduction in price by all gas undertakings, for the reasons advanced in the "JOURNAL" last week, to which one or two others might be added if it were necessary. Though the price of coal is being reduced at the pit head by a uniform amount for all varieties, there is not equality of gas yield from different coals, nor is there equality of conditions under which the coal is used, as between one undertaking and another.

However, another step in the matter has been taken during the week by the issue of an Order which imposes the obligation upon colliery owners to sell to gas undertakings, or their factors or merchants dealing in gas coal, their requirements at 10s. per ton below the previously prescribed standard rate, for the proportion of the coal to be used for making gas for domestic but not industrial purposes, which division only means a lot more work and complication for both gas undertakings and collieries, and is of no material advantage to anyone. There is placed upon the secretary or manager of the gas undertaking the obligation to give a certificate guaranteeing that the specified proportion of coal will be used for making gas for domestic purposes; but, as no one can foresee the effects of outside conditions upon the proportion of coal that will be required respectively for domestic and industrial gas production, it is interesting to note that the Coal Controller possesses the power to vary or to prescribe the amount of coal in respect of which the deduction of 10s. is made. Absolute discretion is given to him in this respect. Disclosure may have to be made of the books containing a record of coal transactions. It will be observed that all conditions apply to any coal purchased, whether under contract or otherwise. The provisions of the Household Fuel and Lighting Order, and any modification of it, are to be brought into use to assist discrimination, or to help to solve any mysteries or difficulties that may present themselves. Coal drawn by any gas undertakings in Ireland from Great Britain also comes under the Order.

The officials concerned in carrying out the Order will be interested in one of its final provisions. Any offence against the Order may relieve them of their official duties for a term not exceeding six months, with or without a fine not exceeding £100; and if the case is a very bad one, the imprisonment may be accompanied by some form of work differing from that upon which the official is normally occupied. There will be painstaking effort to try to comply faithfully with the requirements of the Board of Trade in this matter.

Efficiency and Inerts.

THE Midland Junior Gas Association are to be congratulated upon having secured Mr. James W. Wood, Research Chemist of the Fuel Department of the Leeds University, to read a paper on "Efficiency, and the Effect of Inerts" upon the Thermal Efficiency of the Use of Coal Gas." Mr. Wood went before the members with good credentials; for he has been mainly responsible for the work so far done by the Gas Investigation Committee of the Institution of Gas Engineers and the Leeds University into the behaviour in use of different grades of gases, and the results of which work up to last June have been published. There is one thing that the more ardent critics of such investigation appear to overlook; and it is that if all were known

that is to be known about any particular subject, there would be no need for research into it. As the research progresses, its revelations are as informative to the man making the research as to those for whom the research is being made. It is no use for him to start off with preconceived ideas, and then try to justify them by the lines he takes in the investigation. If Mr. Wood and those supervising his work had begun in the belief that this, or that, or any other man was right in what he had put forward as to the efficiency of different grades of gas in use, the work might have been prejudiced, and the results largely vitiated.

As Mr. Wood has advanced with the investigation, knowledge has naturally broadened; and he is able now to examine matters from practical points of view that exist outside the laboratory. He finds, too, that first impressions have had to be modified by subsequent findings, and that original expectations have had to be abandoned. "At one "time," he remarks, "it was expected that as the result of "the labours of the Gas Investigation Committee, it would "be possible to say that a gas of such and such composi- "tion and calorific value would yield the highest thermal "efficiency in use, and that other gases could then be "assessed according to the closeness with which they ap- "proached this quality. The expectation must be entirely "abandoned." The reason for this is that the factors that bear upon this question, and have to be considered, are of polyphase order. War time, with its varied experience in gas production on the large scale provided by town supply, has shown that a reasonably high thermal efficiency is attainable over a very wide range of composition and calorific value; and this experience cannot be ignored in any investigation that is made, and conclusions that are drawn. This practical experience has made a very fine supplement to laboratory investigation. The thermal efficiency of a gas, too, will vary in use with each type of apparatus; and, as Mr. Wood says, the maximum thermal efficiency reached in any given appliance may not be a fair index as to the usefulness of a given quality of gas for general purposes. Every type of apparatus has also representatives on the market that are good, bad, and indifferent. And as the degree of care varies with different consumers, there again is a prolific cause of departure from maximum efficiency in use. There are influences here that the gas suppliers cannot control. But it is their business to supply the gas that, in their individual circumstances, is the best and most economical means of generating the potential heat units for varied uses, and then by periodical inspection to see that the consumers' appliances are properly adjusted, and in such order that they will, with intelligent use, give the highest attainable efficiency. Gas suppliers can do no more. They cannot stand over the consumers to see that they do not misuse the gas or the appliances, any more than can the coal merchant or the electricity supplier.

The point, however, is a very important one as to the periodical adjustment and examination of gas-consuming appliances. The Board of Fuel Research has recognized this; and it is quite possible that such work will be made a legal obligation in establishing the business of the gas industry on a heat-unit basis. Mr. Wood says that the only rational course is to send out appliances from the gas-works properly adjusted to give the highest thermal efficiency with the local gas under normal conditions, or else to employ an efficient maintenance staff. Assuming a choice of the two methods, we should prefer the latter, as it keeps the suppliers in constant touch with the consumers; and no matter whether the appliance is properly adjusted or not, it is, like any machine, better both for the gas consumer and the gas supplier that it should from time to time come under the critical inspection of a trained eye. The South Metropolitan Company send out their appliances adjusted in what Mr. Wood describes as the "rational course;" but they also, in addition, find great benefit from sending men round to make periodical inspection. Adjustment and maintenance are both necessary to satisfaction. We take it that what Mr. Wood means by "rational course" is to have fixed adjustment; and this means uniformity of the quality of gas, which is a condition every gas engineer should aim at, but from which uncontrollable circumstances sometimes compel departures. Means of adjustment at the consuming end confer the power of elasticity at the manufacturing end. This is a working consideration that has to be kept in mind; and so it is satisfactory to know that "the means of adjust- "ment of appliances provided by the makers are sufficient "to cope with wide variations in gas quality." And as the human race has been endowed with brains, the education of the people in the use of air-adjusters should not be a matter of great difficulty. There is a point that is made in connection with the diagram presented by Mr. Wood; and it is that, in making choice of gas appliances, the gas manager should not select a burner with which maximum efficiency is maintained over a very narrow B.Th.U. range, but for general use one with a somewhat lower thermal efficiency, but greater working range. A study of the curves and the accompanying remarks will quickly show the value of the suggestion.

However, the first part of Mr. Wood's paper provides further confirmation that the attempt to standardize the quality of gas on a universal basis is wrong. Parliament was told this long ago; but Parliament has been fond of stereotyping, and has an affectionate regard for precedent. It cannot be done economically from the manufacturing standpoint; and the gas of universal standard may not be the best for the maximum service required of it in any locality. Nor must we give undue weight to the question of thermal efficiency at the consuming appliances without giving due consideration to the question of economy at the gas-manufacturing end; for it may well pay the consumer to recede somewhat from maximum thermal efficiency, in order to secure economy of cost. That is a point that should not be lost sight of in connection with inerts. We can see no advantage in avoidable inerts, if the consumer's pocket derives no advantage from their presence. But it is quite obvious that the 15 p.ct. of inerts to which the industry is ultimately committed by the Beilby report agreement is so stringent that it rules-out of possible adoption for town supply carbonization schemes which aim at the complete gasification of the coal, and limit the industry to the utilization of part of its coke in making water gas separately or by steaming the charges in retorts. With all the results of his research work before him, with all his deductions from theoretical consideration, Mr. Wood finds no objection to 25 p.ct. of inerts; and Dr. E. W. Smith the other day went 5 p.ct. higher. The percentages agreed to for the Beilby report were forced by the local authorities and the railway companies; but we cannot think—if their technical experts had previously considered what has now been advanced by Mr. Wood, the results published by the Gas Investigation Committee, and the information collected by Mr. Cranfield in the William Young Memorial Lecture—that they, together with the Fuel Research Board, would not have concurred in a more reasonable latitude being allowed in order to give better scope to the realization of greater economy and working efficiency, without in any way harming the consumers, but rather benefiting them. The 15 p.ct. (after a temporary 20 and 18 p.ct.) is purely a victory for sciolism and dogmatism over fact established by research.

But for ordinary domestic supply, there must be reason both ways; and in every case the object must be to strike the right line between thermal efficiency and over-all economy. It is shown by Mr. Wood that with high percentages of inerts the specific gravity rapidly increases; and the volume of gas to be distributed and dealt with at the consumers' burners is also considerably enlarged to realize the same potential heat energy. Some men ridicule the effect of the higher specific gravity; but ridicule does not alter fact. Owing to the irregularity of mixing, there is the difficulty of maintaining constant specific gravity, and therefore constant results. There are some men who affirm that, with gas into which they have introduced before storage and distribution a fairly large proportion of inerts, and not as air in proximity to the point of combustion, they have found improved results, particularly with the incandescent burner. But we question whether these results are constant. They attribute this, but cannot give any reasonable explanation why it is so, to some hidden effect of the inerts. What effect can incombustibles have? The only possible explanation of the assertion it seems to us is that the comparisons are made with gas that was formerly of such a quality that insufficient primary air was drawn in at the burner, or there was inadequate admixture, and that the presence of the inerts reduced the air requirement.

There are many lessons in this paper to be obtained by study. But the chief one is that reason has to be applied in considering the question of the quality and composition of gas. If we can obtain, as we know we can, good economy

in the use of coal by supplying a high percentage of combustible gas produced by water gas separately made or in the retorts themselves, then there will be a less tax upon the distribution system and the consumers' appliances. But on the other hand a too great refinement in the production of coal gas *per se* may mean on many gas-works unnecessary cost and loss of economy, which economy might be realized by the granting of a reasonable latitude. The imposing, too, of as little trouble upon the consumers as possible is also a condition to be desired. Hence the necessity of constancy—constancy in calorific power, and in specific gravity and pressure. Hence, too, a gas by which, if there is a little reduction of efficiency from the maximum realizable by the appliance, results can be the most consistently obtained, and that gas is not one of high calorific value. It is a gas that is, within a good range of calorific value, capable of easy and thorough aeration. This is a large question which must be considered in all its multifarious bearings.

Electricity Scheme Finance and Policy.

THE Lord Chancellor introduced the Electricity Supply Bill to the House of Lords on Wednesday; and he had a nasty fall through his inability to deal with the vigorous attack that was made upon policy and finance as represented by the Bill, which the visionaries of the Government are satisfied is going to supply the means of rejuvenating the industries of the country, and give them the one thing needed to restore and to develop a great prosperity. Never was a more foolish hope entertained by a British Government. It is not electricity the industries are wanting. It is a policy that will replace industrial unrest by peace, and that will supply cheaper material upon which to work. Given these two primary essentials, there will be the enterprise within the industries themselves to get through the proper agencies what they require in the shape of power. The fact of the matter is the Government have gone into this business absolutely blindfolded; and when challenged they always fall back on the one defence, that they have been advised in the matter by competent experts—presumably those who were members of the Board of Trade Committee, and whose individual opinions, rather than the competence in this particular matter of the remainder of the members, led the Committee. No one questions that a measure of reorganization is required by the electrical industry; but now is not the time. So it came about that in the Lords both the policy of the Government's proposals and the finance involved were challenged; and the debate had to be adjourned in order that the Lord Chancellor might be fortified as to the reply he should give.

There were only three speeches made other than that of the Lord Chancellor, and not one was favourable to the scheme. What does the Bill promise? "A cheap and "abundant supply of electricity." Upon these words Lord Downham (who has been an electricity company director for thirty years) fastened; and he showed the poverty of the chance of any fulfilment. The Bill proposes to authorize the spending of 20 millions by the Board of Trade or the Ministry of Transport (to be repaid with interest) on initial electricity works for the scheme; and authority is to be given to the lending of 25 millions to the District Boards or Joint Authorities—together 45 millions. Lord Downham estimates that what is in contemplation in the way of superstations and transmission lines will require at least 150 millions; and Mr. W. F. Fladgate confirms this in "The Times." These highly expensive stations could not be brought into use all at once. Years would be required to build up the necessary load, if it is possible to build it up, to the point where the maximum attainable efficiency and economy would be reached; and there would have to be capital expenditure in the present which could only be made productive in the far future. The capital provision in the Bill, though described in millions, looks more and more inadequate as examination is made of what is in view. Lord Downham points out that the Government cannot raise loans now under about 5½ p.ct.; and the great electricity supply company on the North-East Coast are to-day offering 7 p.ct. for 1½ millions of new capital. One of the Consulting Engineers of that Company (Mr. C. H. Merz) was on the Board of Trade Committee who advised the Government to carry out the complicated scheme adumbrated in the Bill. Mr. Merz knows that capital is not to be obtained to-day on the old terms. If capital is to be attracted into "any industry, it must have a fair reward" says Lord Downham. That is undeniable; and people to-day are not gauging what is an equitable reward by the conditions that existed in 1914, but by those that exist to-day. Excepting the meagre 45 millions, the Bill is barren of any indication as to the finance that will be involved. The Government appear to be delightfully ignorant, when they set out to provide "a cheap and abundant supply of electricity," of the part that capital has in costs. Even in the densely populated area of the Metropolis, 42 p.ct. of the cost of electricity supply is due to capital charges; and a given amount of capital to-day will not purchase half what it would have done in 1914. The position, therefore, does not look hopeful for the fulfilment of the dream of the Government.

It is not only a question whether the Government have been well-advised from the financial side, and whether the scheme will provide a cheap supply of electricity, but whether the policy of the Bill is right. Lord Moulton emphatically says it is not; that to take a large industry out of private hands and bureaucratize it is a fatal error; and that to multiply the size of an industry on borrowed money, when the country has a debt upon it of 8000 millions, is something that is wrong, and cannot be lightly regarded. No one knows the financial demands that will be needed to carry out these projects; and once the Government enter upon a scheme of financing, they will not be able to stop if supplementary funds are not forthcoming from other quarters. The Government are being forced by public opinion to retrench; but simultaneously they are opening-up fresh channels of expenditure. Lord Moulton is persuaded that they have not reflected upon the cost of this electricity scheme; and certain it is they have not reflected on the consequences. There were, as customary, many wise things in his Lordship's criticism and warning to which the Government cannot fail to give heed. Among them he pointed out that, in committing cities and towns and large populations and industries when meeting their electrical requirements to huge generating stations and miles and miles of transmission cables, they are placing in the hands of any individual fanatic, or others who are hostile to society, a very effective power for wholesale harm. This idea has been laughed at. Nevertheless it is a serious risk; and the ease of the passing from the state of being a risk to actuality has on more than one occasion been demonstrated. We agree very sincerely with Lord Moulton that industry should be brought into closer contact with the individual; but this Bill takes us upon the high road to greater severance. Will the Government pause over the view of a far-seeing mind, that "the "policy upon which the Bill is based is a retrograde and "injurious step in the history of British industrial life?" We fear they will not. Blindly the Government have proceeded with the Bill; they have been patching-up blunder after blunder in connection with it until it has been largely transformed from the original one; and now there would be loss of prestige if, after all that has been said as to the wonderful things that are to accrue from the scheme, the Government stepped-back, and abandoned this costly inauguration of their many schemes of reconstruction, which had their genesis in days when there was much dreaming of dreams and seeing of visions.

Purification Problems.

The address on "Purification" that Mr. David Vass, of Perth, delivered last Saturday to the Scottish Junior Gas Association (Eastern District), though short, is full of points for consideration. It is published to-day. References in it to the work of Mr. William Young show how far advanced of his contemporaries he was in many gas matters. Among other points in the address there is remark upon the fact that sufficient use is not being made of the high proportion of caustic ammonia found in the hydraulic main liquor for absorbing carbonic acid and sulphuretted hydrogen. Mr. Vass shows how the work of Mr. Young leads up to the conclusion that, if the hydraulic main liquor can be separated and freed from tar, and conveyed either to the first portion of the scrubber, or be pumped into the top of the condensers, it would do useful work in the direction indicated. Mr. Vass is a strong advocate, too, of the backward rotation system. The subject of the internal corrosion of gas services is also mentioned; and Mr. Vass is inclined to ask, Can this trouble be due to sulphur compounds combined with ammonia or cyanide acting on the iron pipes? The work of

Mr. J. G. Taplay, as described in the Gas-Meters Joint Committee report at the last meeting of the Institution of Gas Engineers, should be of assistance in confirming the belief that is implied, if not directly expressed, by the question.

Coal Control in Danger.

The Government the other day stood in imminent danger of having a vote against them over the continuance of coal control. The Standing Committee of the House on the War Emergency Continuance Bill had a motion before them by the Solicitor-General that the Government should be given permission to retain powers to control coal, coke, gas, and electricity. There were strong protests against this—the speakers contending that there was no further necessity for control. A division was challenged, when the motion was agreed to by nineteen votes to twelve. It would only have required four more votes to turn the scale. No doubt the Government would then have appealed to the House; but the voting shows that there is not any striking unanimity over the question.

Nationalization, and then Syndicalization.

It is stated that the Government negotiations with the railway men are not running smoothly. The reason is, as in the case of the miners, that acceptance of the offers made by the Government would obstruct the realization of the programme of the Union leaders, which would carry them to the stage of nationalization. The Government are not prepared to go so far. Their policy is control, with representation of the workers on the controlling bodies. But the unions are out for nationalization; and those who make a close study of these matters see that nationalization would be made the starting-point for syndicalization, which means ownership by the workers, and operation for their own exclusive benefit. The miners talk of compelling and insisting; the nation must insist upon the first stage of the plot not being realized.

Unauthorized Strikes.

We are glad to see that the Federation of General Workers (members of which are the National Union of General Workers, in which Union the gas industry is concerned) have, at a representative conference, passed a resolution that "no District Committee shall have power to sanction a strike without the consent of the Committee of each of the affiliated unions, and endorsement by the Executive of the Federation." Well known to the gas industry are Mr. J. R. Clynes, M.P., Mr. Will Thorne, M.P., and Mr. James O'Grady, M.P.; and these are among the leading spirits in this movement.

Local Authorities and Subscriptions to Associations.

Some local authorities owning gas-works believe they are under some legal disability regarding subscriptions to organizations whose functions are to advance the interests of the gas industry. It is a pity that a clause is not framed and put in a General Act which would settle this matter once and for all, by empowering subscriptions to the funds of such organizations. We would suggest that this could be accomplished in the Board of Trade Bill that is under preparation. There is precedent for it in the Electricity Supply Bill that was introduced by the Board of Trade, and which has passed through Committee and the House of Commons. The clause provides that "district electricity boards or any authorized undertakers may, out of the revenue of their undertakings, pay reasonable subscriptions, whether annual or otherwise, to the funds of any Association formed for the purpose of consultation as to their common interests and the discussion of matters relating to the supply of electricity, and to the funds of any recognized Association working on a non-profit earning basis for developing the use of electricity, and may purchase reports of the proceedings of any conferences or meetings, and may pay the reasonable expenses of attendance of any members or officers of the board or undertaker at conferences or meetings of the said Association or any of them." What is good for electricity should be equally good for gas.

Patent Office Library.

We sympathize with professional men who are engaged in business throughout the day in their desire to have the Patent Office Library kept open till ten p.m. daily, as was the practice for 25 years before the war. A petition on the subject is going to be sent to the President of the Board of Trade, which will point out that (though the library is maintained from the national funds), through the hour it is closed many men in the chemical, engineering, and other technical professions are debarred from access to information they cannot obtain elsewhere. From the 1st inst. the library is being kept open until eight o'clock; but there are would-be readers who cannot reach the library until a comparatively late hour. Eight o'clock therefore seriously curtails usefulness; and this is adverse to the national interests. Copies of the petition, which has received the approval of a number of technical and scientific societies, can be obtained of Mr. Charles Salter, No. 33, Park Hall Road, East Finchley, N. 2.

PERSONAL.

RETIREMENT OF MR. HARRY WIMHURST.

A well-earned rest, which we hope he will long live to enjoy, is to be taken by Mr. Harry Wimhurst, the popular Engineer and Manager of the Sleaford Gas Company. He expects to retire into private life as from March 31 next, and to take up his residence for the rest of his days in the beautiful Lincolnshire town where he has spent the best part of his life. In a few weeks he will be seventy years old; and having had no less than 56 years of strenuous and continuous work in the gas industry, he has rightly determined that the time has arrived when he will be fully justified in taking things more easily. His interest in the Gas Company will not cease upon his retirement, as he intends to retain the seat on the Board to which he was elected something like five years ago.

Mr. Wimhurst was born on Jan. 15, 1850, at Chichester, where he remained for the first 22 years of his life. In 1864 he was articled as a pupil to the old Chichester Gas Company, and eight years later was commissioned to carry out some alterations to the Sleaford Gas-Works. His next move was in 1875, when he was asked to take the position of Manager of the Andover Gas Company; but after spending four years there, he was recalled in 1879 to take over the management of the Sleaford Gas-Works. For the Sleaford Gas Company, it need hardly be said that Mr. Wimhurst has done a great deal. He has carried out the erection of new works, and laid new mains all over the district; and he has seen the price of gas fall from 4s. 10d. to (pre-war) 2s. 10d. and 2s. 3d. per 1000 c.ft. for power, and the dividends rise from 5 p.ct. less tax to 10 p.ct. free of income-tax—the latter rate having been paid for many years.

The greatest pride of Mr. Wimhurst in connection with the gas industry is in having been one of the founders in 1888 of the Eastern Counties Gas Managers' Association, at whose meetings he has met many genuine friends and comrades-in-arms. May there be many more such meetings! Mr. Wimhurst joined the British Association of Gas Managers in 1876; and since that time his record of attendance at the annual meetings of that Association and its successors has shown only one miss—and that was through an accident to his foreman.

Among the members elected at last Tuesday's meeting of the Institution of Civil Engineers was Mr. THOMAS HARDIE, the Engineer of the Newcastle-on-Tyne Gas Company.

The Blackburn Town Council have decided to invite applications for the position of Gas Engineer and Manager, at a commencing salary of £900; the age limit being fixed at 45. Mr. J. W. M'LUSKY has entered upon his new duties at Glasgow.

The position of Engineer and Manager of the Wisbech Lighting and the Wisbech Water-Works (joint) Companies has been filled by the selection of Mr. J. GREEN, the Chief Assistant and Chemist of the Ash Road works of the Aldershot Gas, Water, and District Lighting Company, to whom he came from Redcar about six years ago.

Mr. EUGENE MEUNIER, Engineer and Manager of the Chapel Whaley and District Gas Company, has been appointed Assistant Engineer and Manager to the Colombo (Ceylon) Gas Company, and expects to sail during this week.

Mr. JOSEPH NEWBOLD, who has now retired from the service of the South Metropolitan Gas Company, succeeded the late Mr. Henry Austin as Employees' Director in 1910.

It has been decided to increase the salary of Mr. W. J. SMITH, the Bolton Corporation Gas Engineer and Manager, from £850 to £900 a year.

The President of the Board of Trade has appointed Mr. GARNHAM ROPER, C.B., to be a Pilotage Commissioner; and, in consequence, Mr. Roper will cease to act as Assistant Secretary for the Public Utilities and Harbours Department of the Board of Trade. Part of the work of the Public Utilities and Harbours Department was transferred to the Ministry of Transport. In future all duties hitherto undertaken by that Department in connection with gas and water undertakings will be carried out by the Power, Transport, and Economic Department, at Great George Street, Westminster.

OBITUARY.

FREDERICK A. PRICE.

The death took place, with painful suddenness, at a Manchester nursing home, on the 4th inst., of Mr. Frederick Arthur Price, Superintendent of the Manchester Gas Department, and one of the best-known and most popular of Corporation officials. Though he had not been well for a little time, he was at his post the previous week-end; and the announcement of his death came as a great shock, not only to the Town Hall staff, but to the business community generally, and the workpeople under his supervision, by whom he was so well liked and admired. Naturally of a sunny disposition, he made friends everywhere. Nothing was too much trouble for him; and his never-failing courtesy and kindliness of heart made it a pleasure to come into contact with him. He was a man of deep sympathies and high integrity; and the Gas Committee and the Corporation have lost a valuable official.

Mr. Price, who was 64 years of age, joined the service of the Gas Committee in 1877 as Clerk to the Superintendent. In 1909 he was appointed Superintendent, in succession to the late Mr. Charles Nickson. Most of his energies were centred in his official work and in the interests of the employees under him. During the war, for instance, he was Chairman of the Gas Department Benevolent and Comforts Fund. He was also an ex-President of the Sick and Provident Fund, and a member of the Corporation Thrift Fund Consultative Committee; and, further, he was divisional officer for the Coal Controller in connection with the rationing of gas. Prior to going to Manchester, in his early years, he was employed on the North Wales section of the London and North-Western Railway, and in the Engineer's Office of the Liverpool Water-Works.

The funeral was arranged to take place yesterday (Monday) afternoon, at the Hale Cemetery, when it was expected that a large number of the Committee and staff of the Gas Department, as well as other Corporation officials and representatives of the gas industry, would attend to pay their last respects.

The Bombay Gas Company, Ltd., have lost a much valued member of their Board through the death last Tuesday of Field-Marshal Sir EVELYN WOOD, V.C., G.C.B., G.C.M.G. It will be remembered that the Marshal used to be a Director of the Wandsworth and Putney Gas Light Company; and in moving his re-election at the meeting in the early part of 1912 (the year of the passing of the Bill for the amalgamation of the Company and the Mitcham and Wimbledon and the Epsom and Ewell Gas Companies), Mr. H. E. Jones, the Chairman, speaking as an old friend of some forty years' standing, pointed out the advantage of having such a man as Sir Evelyn Wood sitting on the Board. Whenever a question arose, he said, as to the morality or propriety of anything they were proposing, Sir Evelyn would remind them to keep to that point of view. It was the point of a high moral standard that had always characterized his distinguished career.

U.S. Bureau of Mines Experimental Station.

At Pittsburgh there has been erected, and in use for the past two years, an experimental station of the United States Bureau of Mines, splendidly equipped for investigations in all branches of the industries represented. The chemical and physical laboratories consist of research units and special laboratories devoted to those branches of the Bureau's work in the mining and metallurgical industries which are represented at the station. Weekly conferences are held, at which each investigator brings up his problems for discussion. The analytical laboratory is engaged principally in making the necessary analyses and tests in connection with the more efficient utilization of the fuel resources of the country, and with the investigation of mine accidents. The laboratory is fully equipped with apparatus for the complete and accurate analysis of coal, coke, lignite, and peat. There are, as a special feature, constant-temperature calorimeters constructed in the Bureau's instrument shop, which are said by Mr. A. C. Fieldner, in describing the station, to be capable of giving the highest precision in determining the heating values of fuels in approximately half the time required by ordinary commercial instruments. There is also a special room, with complete outfits of furnaces, pyrometers, and all accessories needed for the determination of the fusibility of coal ash. The equipment used in gas investigations is highly specialized; much of it having been developed in the laboratory, and built in the Bureau's shops. Complete apparatus for the liquefaction and fractional distillation of gas mixtures at low temperatures by using air and mercury pumps is available for natural gas and other complex gas mixtures that cannot be handled by the ordinary methods. At the beginning of the war the gas laboratory was turned over completely to war investigations. There is at the station a bye-product coking unit, for solving the many problems in connection with the carbonization of bituminous coal, with the recovery of bye-products. A comprehensive investigation is being conducted of the forms in which sulphur occurs in American coal and lignites. The low-temperature carbonization of lignite is also now being studied.

FEDERATION OF GAS EMPLOYERS.

Cases before Munitions Tribunals.

Two cases have recently been contested by a representative of the Federation of Gas Employers (Mr. S. S. Ogilvie) before Munitions Tribunals on behalf of members of the Federation. The first case took place at Halifax on the 26th ult. [reported last week, p. 500], when the Elland-cum-Greetland Gas Company were summoned at the instance of the Workers Union, under the Wages (Temporary Regulation) Act, 1918, on the ground that the Company had not paid "the prescribed rate" within the meaning of section 1.

The Union alleged that the wages paid in Halifax constituted "the prescribed rate" for Elland, which is about three miles distant from Halifax. The Company's case was that the rates payable in Elland had always been different from those payable in Halifax; and that as the Company had always abided by the national awards, no offence had or could have been committed. Further the Company relied on clause 10 of the award dated Feb. 25. The Union did not call any witnesses; and the case was dismissed with three guineas costs.

The case undoubtedly raised a question of great importance; and the remarks of the Chairman of the tribunal are of interest. He stated that, in cases of this character, it was necessary for the complainant to prove that the rates in the two districts had been the same; and that it was not sufficient merely to prove that a neighbouring district was paying a higher rate. If the unions were dissatisfied with the rate of wages paid in a district, their remedy was an arbitration to vary "the prescribed rate," and not a complaint before the tribunal. [In this respect, however, it is noteworthy that an employer cannot now, under the Industrial Courts Act, 1919, be compelled to go to arbitration.]

The second case took place at Huddersfield on the following day (Nov. 27), when the Kirkburton Gas Company appeared to answer the complaint of the Workers' Union that they had not paid the prescribed rate to shiftmen. At the hearing, the Union withdrew their complaint.

The representative of the Federation, however, made the point clear that, in future, whenever a gas company was brought before the tribunal upon a complaint, penal in character, it would be necessary to ask for costs, unless the case was proceeded with. The Chairman of the tribunal in both these cases pointed out that the charges, if proved, constituted a penal offence, and that therefore it was the duty of the complainant to prove his case up to the hilt.

ELECTRICITY SUPPLY MEMORANDA.

As announced last week, the Electricity Supply Bill has passed through all stages of the House of Commons; and the electricity industry is now trying to find out exactly how it is situated. But it is not making a good job of the attempt to focus the position. This is not very astonishing; for uncertainty still encompasses. There is talk of the Electricity Commissioners being independent; and this is giving gratification. As a matter of fact, as the Bill stands, they are in matters that are really important to get the confirmation of the Board of Trade, and endorsement of the Board's decisions will also be required from Parliament. As the electricity powers of the Board of Trade are to be transferred to the Ministry of Transport, this again will make a difference. Almost unanimously, the electrical papers condemn the transfer. They have always opposed it; and they show no disposition to become reconciled to it, notwithstanding that Sir Auckland Geddes painted a pretty picture of the "rivers of power" that would flow along the railways, and which could be tapped for the supply of rural and other areas. So the railways will become the main arteries of electricity supply. What the electricity industry thinks, assuming that the papers accurately represent its opinion, is that it should have been allowed some voice in determining who should govern it; but this is not the way of the Legislature. Of course, the objection to the whole business of electricity supply being under the Ministry of Transport is that the department will always think in terms of railways and transport first, and of other supply as a secondary claim. Although the railways may use only one-fifth of the energy generated, says Sir Eric Geddes, the Minister of Transport, it is a highly important one-fifth; but distributors of the four-fifths are of opinion that the one-fifth should be appended to the four-fifths, and not the four-fifths to the one-fifth. We seem to remember that the "Electrician" was at one time as strongly opposed as any of the technical papers to the industry coming under the domination of the Ministry of Transport; but now it hopes that the matter is settled once and for all. It points out that extensive electrification is being prepared; and that the railway load is one which, from the point of view of the load factor, will be very advantageous to the super-power stations. It is a little bit shaky upon the subject—recognizing that railway electrification introduces problems peculiar to itself. Sir John Snell is to be Chief Electricity Commissioner; and he has expressed his preparedness to be as loyal to the Ministry of

An Uncomfortable Feeling.

Transport as he would have been to the Board of Trade. The feeling, however, cannot be shaken off that it will always be transport first and electricity distributing industry second.

Local Authority Subscriptions to Organizations.

There are so many clauses in the Bill that the owners of generating stations and transmission lines do not like, that it must be some consolation to find a few that are very acceptable. One of these will relieve all local governing bodies of any doubt as to their legal position in regard to subscribing to the funds of any organization formed for the advancement of their common interests. The non-possession of this power has been made the excuse by many authorities for not subscribing to the Electrical Development Association. Once the Bill becomes an Act, the excuse will have no validity. Of course, we are not going to cheer over the change; but, as companies can do as they choose in this matter, it is only right the local authorities in possession of trading undertakings should have like power. Now that there is this precedent in a Government Bill, there ought to be no difficulty in getting a similar clause in Municipal Bills dealing with gas. The Electrical Development Association will be mightily pleased over the new permissive power.

Reforms Wanted.

Electricity undertakings have had their grievance over the quality of coal. Through the useless material the coal deliveries contain, the evaporative duty of steam-boilers has seriously diminished; and the ash heaps have been increased at a faster rate than before in proportion to the steam or electricity generated. A deputation representing the different electrical organizations associated with generation and supply have recently waited upon Mr. Lee, of the Coal Mines Department, with the object of bringing before him the questions of: (1) The quality of coal supplied to electricity stations; (2) the increase of the price per ton at the pit mouth; (3) the consequent increase in the cost of electricity, and the necessity of advancing the maximum prices at which it may be sold; and (4) the restrictions on the sale of current. The restrictions on the sale of current have already been removed; and the price of coal for generating electricity for domestic purposes has dropped 10s. This, in turn, should have some effect upon deferring the time when maximum prices should be increased. There was no difficulty before this interview in getting the maximum prices revised under the Statutory Undertakings (Temporary Increase of Charges) Act. But without this, as so much current is supplied for power at closely trimmed prices, the power charges contain a good margin for increasing revenue; and no increase of the maximum price should be allowed until there is a close investigation to see the character of the power business, and the charges made for it. The quality of the coal is another matter; and there is no better piece of work the Coal Control Department could set itself than to try to bring about an improvement in this. An improvement would not only increase all industrial efficiency, but would allow good coal to be carried where ash and rubbish are carried now. There is transport waste there, which ought not to be permitted to continue. Successful work in this direction would bring economy to the whole country.

Reductions and Public Anticipations.

Electricity suppliers have had to follow the National Gas Council in warning the public that, in connection with the lowering of the price of coal, the reduction of the charge for electricity could not possibly take place as from Dec. 1, nor could the reduction be the equivalent of the reduction of 10s. in the price of coal. Electricity suppliers, however, are not being saddled with a compulsory reduction (as in the case of gas companies) of the price of a second product—coke. However, with this exception, Mr. H. B. Renwick, the Chairman of the Provincial Electric Supply Companies, has made practically the same case in the Press as was made on behalf of the gas undertakings. He says that any immediate reduction in the price of electricity is out of the question, and that whatever reduction may ultimately be made must for the following reasons fall short of the material reduction apparently anticipated by the public: (*a*) The cost of coal is only one of very many costs in generation and distribution, in which wages and bonuses imposed by the Government figure very largely. (*b*) The existing stocks of coal bought at the old prices, which in some cases are quite large, have to be first used up. Some gas companies are happy in the possession of decent stocks, but very unhappy regarding the effect that this will have on the price charged to their consumers.

Conscientious Objectors.

We think there must be a good many conscientious objectors among the showroom men of the electricity industry. We learn from the "Electrician" that, "at the present time, too many of those engaged in electricity supply work are inclined to praise the apparatus which they are supposed to be selling with a faintness that is almost a condemnation." It is all very well for the man in the safe seclusion of his editorial sanctum to censure the salesmen for exercising an amount of prudence. The man who censures is not the one who has to meet irate consumers, who may have been induced by a too plausible tale to invest in a piece of costly apparatus, which has also been rather expensive to instal, and has not come up to representations. The salesman knows about cost, the distressing length of time that it takes to perform electrically many operations, the unreliability, the expense of maintenance, and the drop of efficiency. He has no stomach for being accused of deception, and for being told that a word that looks a bit vulgar in print would be a fitting appellation for him. However, our electrical contemporary opines that what is wanted is the education of those who have to educate the public. This all depends on the line the "education" takes.

Indeterminate.

We are interested in the Presidential Address of Mr. J. A. Robertson to the North-Western Section of the Institution of Electrical Engineers. There is a goodly amount of hypothesis and assumption about what he says. According to him, it is now placed beyond all doubt that electricity is the most efficient and cheapest form of power for industrial purposes. It all depends upon the conditions of use; and, this being so, there is a good deal of doubt about the general assertion. Another statement is that it is likely that within the next five years £100,000,000 will be expended in the construction of new electricity generating stations and transmission lines. Capital charges are a serious item in electricity supply; and if the sum of 100 millions is to be spent within the next five years, it is probable that it will only represent plant that less than half the money would have provided before the war. Cheap power does not lie in that direction. Mr. Robertson mentions the talk there has been of carbonization forming an integral part of electricity generating schemes. This leads him to remark that a gas-engine as a prime mover has a slightly higher efficiency than the steam-boiler and turbine. But he asserts it is quite unsuited to power production on a large scale; and the distribution of gas over large areas for power purposes is not a practical proposition. As to the first part of this declaration, we wonder how Mr. Robertson accounts for the enormous generating plants in the Rhine area that are operated by large gas-engines? And why does he suppose that to distribute gas over large areas for power is not a practical proposition? Low-grade power gas can be distributed at very high pressures; and gas-mains for the purpose are not so expensive as electric transmission lines. As to combining carbonization with power generation, Mr. Robertson has not so far seen a practical proposition which commends itself. Nor have we. Has he considered the linking of gas-works with power generation? There is the coke; and this can be used (as it is being used in power stations), or gas can be developed from it for engine-driving or boiler-firing. The address includes figures as to fuel consumption at existing generating stations, ranging from the exceptionally low figure of 1·8 lbs. of coal per unit to what he calls a "freak" figure of 63·25 lbs. The 1·8 lbs. is equal to a thermal efficiency of 18 p.ct. But Mr. Robertson knows as well as we do that, under the conditions of electricity demand, no matter how good the stations may be, such an efficiency is universally unattainable. And therefore when he says "if" the whole of the energy produced by the 438 stations (included in the returns quoted from) had been generated as economically as it was at the stations showing the 18 p.ct. thermal efficiency, the saving of coal would have been fully 3¼ million tons, or 47 p.ct. of the total consumption, we cannot help thinking that while there is great virtue in an "if" at any time, this particular "if" takes a foremost place—just as the North-East Coast electricity supply area takes the lead in presenting conditions of demand that can only be admired by electrical men in other supply areas, but cannot be reproduced by them. He deals with the question of fuel saving in relation to the cost of transmission, but only superficially, without advancing any definite data. In making comparison between fuel savings and transmission capital charges, he points out that consideration should be given to the fact that the transmission system consists chiefly of copper and lead, or copper and steel, which are materials that have an indefinitely long life, and a good residual value. "Wastage of coal can never be recovered."

German Dye Trust Competition.

Those responsible for the direction of the great dye industry that has been established in this country recognize that they will have to meet very keen competition for business—at any rate, abroad—from the strong Dye Trust in Germany. News comes from Berlin, through Mr. George Renwick, to the "Daily Chronicle," that the Trust, which consists of seven companies—three large and four minor ones—have decided to double their capital, and to issue a large amount of preference shares. The object of this is to strengthen their competitive position; and to enable them, as soon as possible, to make a vigorous onslaught on the markets of the world. The three large companies have also been making nitrate under Haber's process of extracting nitrogen from the air. Now it is intended that the whole seven companies shall work the process. The plant already set up is said to be capable of producing 300,000 tons of nitrate a year.

Temporary Increase of Charges Act.—Orders have been made by the Ministry of Health under the Statutory Undertakings (Temporary Increase of Charges) Act, 1918, authorizing the Abertillery Urban District Council to increase their maximum charge for gas from 5s. to 6s. 6d. per 1000 c.ft.; the Chard Corporation from 5s. to 7s. 6d.; and the Penrith Urban District Council, from 4s. within the district and 5s. outside, to 5s. per 1000 c.ft. within the district and 6s. outside. Application has been made to the Ministry for an Order by the Tow Law Urban District Council.

NET COST OF COAL FOR VARIOUS SYSTEMS OF GASIFICATION.

By "WORKS MANAGER."

THE question as to which system of gasification gives the best economic results is one which is troubling the minds of most gas engineers at the present time. The author hopes that the following results, worked out some months ago, will be of interest. The treatment may appear somewhat complicated; but it is impossible to form clear ideas on the subject without working somewhat on these lines.

A basis of 200 million cubic feet of gas made has been taken; and the net cost of coal for this amount of gas has been worked out for each system of gasification. See Charts Nos. 1 and 2. Charts Nos. 3, 4, 5, and 6 show the net cost of coal expressed as pence per 1000 c.ft. of gas made for a wide range of coal and coke prices. For each system a basis for the calculations is given, showing yield of gas and residuals per ton of coal; and these are known to be attainable from medium class coals, except in the case of "A" system, which would probably require a better class coal.

NET COST OF COAL FOR 200 MILLION CUBIC FEET OF GAS BY VARIOUS SYSTEMS.

"A" System—*Continuous Verticals, High Steaming.*

Gas	21,000 c.ft. per ton	Cost price of coal	£1 10s. per ton
Tar	14·2 gallons ,,	Net selling price of coke	£1 5s. ,,
Liquor	38·7 gallons ,,	Net selling price of tar	2·2d. per gallon
Coke saleable.	8·72 cwt. ,,	Net selling price of liquor	0·93d. ,,
Calorific value of gas	460 B.Th.U. gross		

Coal required $= \frac{200,000,000}{21,000} = 9524$ tons at £1 10s. = £14,286

Income from Residuals.

Tar $\frac{9524 \times 14{\cdot}2 \times 2{\cdot}2}{240}$ = £1,240

Liquor $\frac{9524 \times 38{\cdot}7 \times 0{\cdot}93}{240}$ = 1,430

Coke $\frac{9524 \times 8{\cdot}72 \times 1{\cdot}25}{20}$ = 5,200

£7,870 = Total from residuals.

Gross cost of coal	£14,286
Less income from residuals	7,870
Net for coal	£6,416

"B" System.—*Horizontal Retorts.*

Gas	12,000 c.ft. per ton	Cost price of coal	£1 10s. per ton
Tar	10 gallons ,,	Net selling price of coal	£1 5s. ,,
Liquor	32 gallons ,,	Net selling price of tar	2·2d. per gallon
Coke saleable	10 cwt. ,,	Net selling price of liquor	0·93d. ,,
Calorific value of gas	530 B.Th.U. gross		

Coal required $= \frac{200,000,000}{12,000} = 16,667$ tons at £1 10s. = £25,000.

Income from Residuals.

Tar $\frac{16,667 \times 10 \times 2{\cdot}2}{240}$ = £1,527

Liquor $\frac{16,667 \times 32 \times 0{\cdot}93}{240}$ = 2,065

Coke $\frac{16,667 \times 10 \times 1{\cdot}25}{20}$ = 10,417

£14,009 = Total from residuals.

Gross cost of coal	£25,000
Less income from residuals	14,009
Net for coal	£10,991

"C" System.—*Mixture of 75 p.ct. Coal Gas from Horizontals and 25 p.ct. Blue Water Gas.*

Coal gas	12,000 c.ft. per ton	Cost price of coal	£1 10s. per ton
Tar	10 gallons ,,	Net selling price of coke	£1 5s. ,,
Liquor	32 gallons ,,	Net selling price of tar	2·2d. per gallon
Coke saleable from horizontals	= 10 cwt. ,,	Net selling price of liquor	0·93d. ,,
		Calorific value of gas	470 B.Th.U. gross

Coke and breeze to water gas generators and boilers = 55 lbs. per 1000 c.ft. water gas made.

Gas to be made by retorts = 200,000,000 × 75 p.ct. = 150 millions.

Coal required $= \frac{150,000,000}{12,000} = 12,500$ tons at £1 10s. = £18,750

Water gas to be made = 50,000,000 c.ft.

Coke and breeze for water gas $= \frac{50,000,000 \times 55}{1000 \times 2240} = 1228$ tons.

Total coke *ex* retort-house. = 12,500 × 0·5 = 6250 tons.

Total coke available for sale after deducting that used for water gas = (6250 − 1228) = 5022 tons.

Income from Residuals.

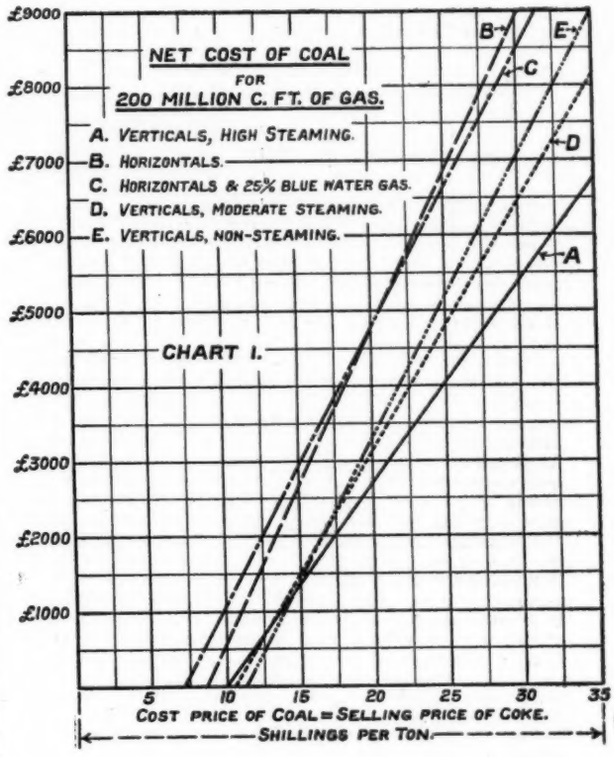
Tar $\frac{12,500 \times 10 \times 2{\cdot}2}{240}$ = £1,146

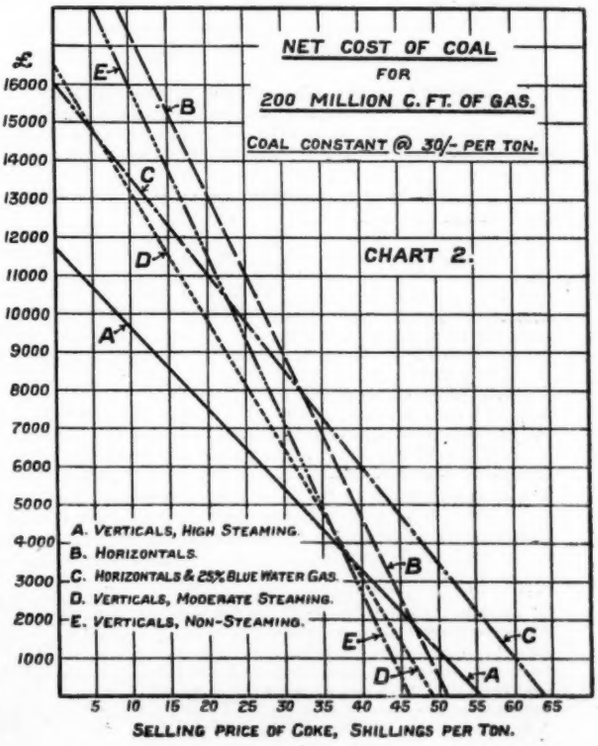
Liquor $\frac{12,500 \times 32 \times 0{\cdot}93}{240}$ = 1,550

Coke 5022 × £1 5s. = 6,278

£8,974 = Total from residuals.

Gross cost of coal	£18,750
Less income from residuals	8,974
Net for coal	£9,776





"D" System.—Continuous Verticals, Moderate Steaming.

Gas	15,180 c.ft. per ton	Cost price of coal	£1 10s. per ton
Tar	13·0 gallons ,,	Net selling price of coke	£1 5s. ,,
Liquor	36·3 gallons ,,	Net selling price of tar	2·2d. per gallon
Coke saleable	10 cwt. ,,	Net selling price of liquor	0·93d. ,,
Fuel to producers reckoned at 11 p.ct. *plus* extra coke consumed in retort and producer due to steaming.		Calorific value of gas	495 B.Th.U. gross

Coal required $= \frac{200,000,000}{15,180} = 13,175$ tons at £1 10s. = £19,762

Income from Residuals.

Tar $\pounds\frac{13,175 \times 13{\cdot}0 \times 2{\cdot}2}{240} = £1,570$

Liquor $\pounds\frac{13,175 \times 36{\cdot}3 \times 0{\cdot}93}{240} = 1,855$

Coke $\pounds\frac{13,175 \times 10 \times 1{\cdot}25}{20} = 8,234$

£11,659 = Total from residuals.

Gross cost of coal	£19,762
Less income from residuals	11,659
Net for coal	£8,103

"E" System.—Continuous Vertical Retorts, Non-Steaming.

Gas	12,166 c.ft. per ton	Cost price of coal	£1 10s. per ton
Tar	13·4 gallons ,,	Net selling price of coke	£1 5s. ,,
Liquor	35·0 gallons ,,	Net selling price of tar	2·2d. per gallon
Fuel to producers	11 p.ct.	Net selling price of liquor	0·93d. ,,
Coke saleable	10·8 cwt. ,,		
Calorific value of gas	530 B.Th.U. gross		

Coal required $= \frac{200,000,000}{12,166} = 16,450$ tons at £1 10s. = £24,675

Income from Residuals.

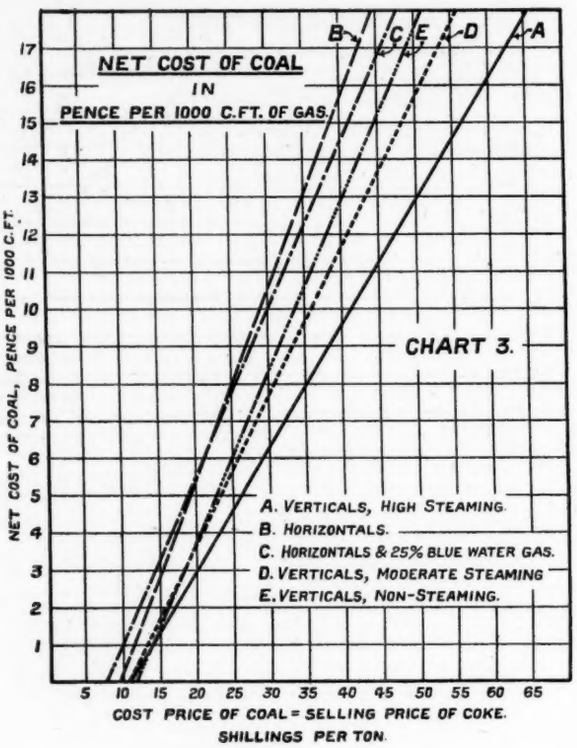
Tar $\pounds\frac{16,450 \times 13{\cdot}4 \times 2{\cdot}2}{240} = £2,020$

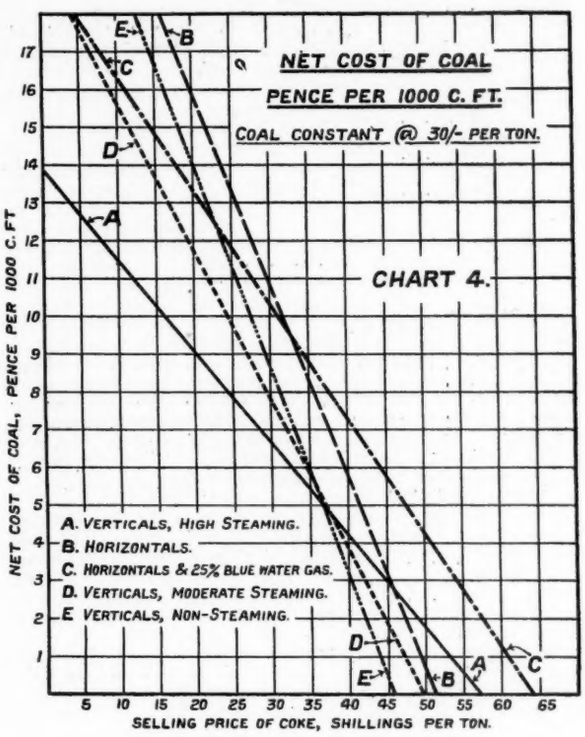
Liquor $\pounds\frac{16,450 \times 35{\cdot}0 \times 0{\cdot}93}{240} = 2,232$

Coke $\pounds\frac{16,450 \times 10{\cdot}8 \times 1{\cdot}25}{20} = 11,100$

£15,352 = Total for residuals

Gross cost of coal	£24,675
Less income from residuals	15,352
Net for coal	£9,323


NET COST OF COAL
IN
PENCE PER 1000 C.FT. OF GAS.
CHART 3.
A. VERTICALS, HIGH STEAMING.
B. HORIZONTALS.
C. HORIZONTALS & 25% BLUE WATER GAS.
D. VERTICALS, MODERATE STEAMING.
E. VERTICALS, NON-STEAMING.
NET COST OF COAL, PENCE PER 1000 C.FT.
COST PRICE OF COAL = SELLING PRICE OF COKE.
SHILLINGS PER TON.


NET COST OF COAL
PENCE PER 1000 C. FT.
COAL CONSTANT @ 30/- PER TON.
CHART 4.
A. VERTICALS, HIGH STEAMING.
B. HORIZONTALS.
C. HORIZONTALS & 25% BLUE WATER GAS.
D. VERTICALS, MODERATE STEAMING.
E. VERTICALS, NON-STEAMING.
NET COST OF COAL, PENCE PER 1000 C.FT.
SELLING PRICE OF COKE, SHILLINGS PER TON.

The foregoing results are set out in the following table, Column 1. In Column 2, the results are given when the cost price of coal is £1 per ton and the selling price of coke £1 3s. 4d. per ton. Column 3 shows results with coal at £1 10s. and coke at £1 10s.

Net for Coal for 200 Million Cubic Feet of Gas.

System.	Column 1. Per Ton. Coal, 30s. Coke, 25s.	Column 2. Per Ton. Coal, 20s. Coke, 23s. 4d.	Column 3. Per Ton. Coal, 30s. Coke, 30s.
	£	£	£
"A," Verticals, high steaming	6,416	2018	5350
"B," Horizontals	10,991	3375	8900
"C," Mixture of— 75 p.ct. horizontal 25 p.ct. blue water gas	9,776	3945	8500
"D," Verticals, moderate steaming	8,103	2065	6500
"E," Verticals, non-steaming	9,323	1828	7100

On an examination of the above results, it will be found that, for given prices for coal and coke per ton, the systems stand in a certain order when arranged according to the net cost for coal, but that with a new set of coal and coke prices, this order is not necessarily the same. For instance, with coal at 30s. and coke at 25s. (Column 1) "B" system (£10,991) is more expensive than "C" system (£9776); but with coal at 20s. and coke at 23s. 4d. (Column 2), "B" system (£3375) is less expensive than "C" system (£3945). Also it will be noticed that with coal at 20s. and coke at 23s. 4d., "E" system (verticals, non-steaming) comes out lowest for cost. Now the net cost for coal for a particular system depends largely upon the prices per ton of coal and coke. The prices for tar and liquor per gallon may fluctuate within fairly large limits, without affecting the net cost of coal to any great extent, compared with the effect of variations of coal and coke prices. Therefore, by determining values for the net cost of coal by each system, for different prices of coal and coke (tar and liquor prices per gallon remaining constant), the general trend of the net cost of coal can be determined.

If, then, the selling prices of tar and liquor be assumed constant at 2·2d. and 0·93d. per gallon, respectively, and if $£x$ = cost price of coal per ton and $£y$ be the selling price of coke per ton, it can be readily deduced, by working out the constant terms, from the cases detailed in the first part of this article that:

Net for coal "A" system for 200 million c.ft. of gas $= £(9524x - 4150y - 2670)$
" "B" " " " $= £(16667x - 8333y - 3592)$
" "C" " " " $= £(12500x - 5022y - 2696)$
" "D" " " " $= £(13175x - 6587y - 3425)$
" "E" " " " $= £(16450x - 8890y - 4252)$

The results, when plotted graphically, will always give straight lines, if x or y be taken at a constant value for a particular graph.

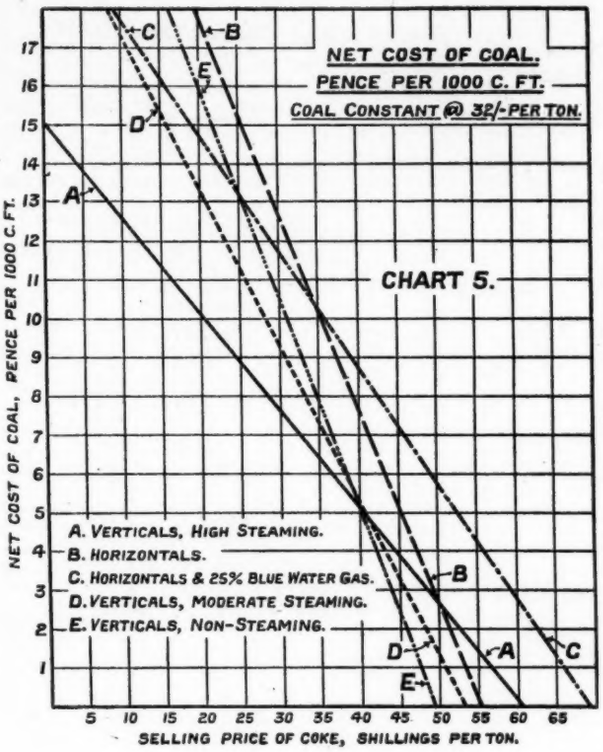
Chart 1 has been worked out in this way on the assumption that the cost price of coal per ton is always the same as the selling price of coke per ton—*i.e.*, when coal is 20s. per ton coke is 20s. per ton, and so on.

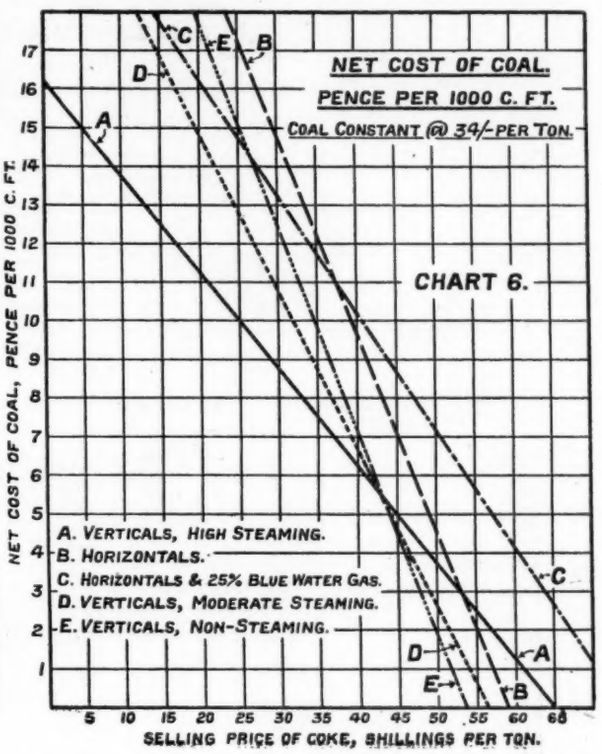
Chart 2.—Coal constant at 30s. per ton; coke at varying prices.

Charts 3 and 4 are obtained in exactly the same way; but the results are shown as net for coal in pence per 1000 c.ft. of gas.

Chart 3.—Coal and coke at equal prices per ton.

NOTE.—In all calculations the selling price of coke is taken to be the average net receipts from all coke, breeze, and dust available for sale. It will be seen from this chart that verticals with high steaming show the lowest net for coal for all prices from about 12s. per ton upwards, and also that the advantage increases as the prices of coal and coke increase. At 20s. per ton, the ad-


NET COST OF COAL.
PENCE PER 1000 C. FT.
COAL CONSTANT @ 32/- PER TON.
CHART 5.
NET COST OF COAL, PENCE PER 1000 C.FT.
A. VERTICALS, HIGH STEAMING.
B. HORIZONTALS.
C. HORIZONTALS & 25% BLUE WATER GAS.
D. VERTICALS, MODERATE STEAMING.
E. VERTICALS, NON-STEAMING.
SELLING PRICE OF COKE, SHILLINGS PER TON.


NET COST OF COAL.
PENCE PER 1000 C. FT.
COAL CONSTANT @ 34/- PER TON.
CHART 6.
NET COST OF COAL, PENCE PER 1000 C. FT.
A. VERTICALS, HIGH STEAMING.
B. HORIZONTALS.
C. HORIZONTALS & 25% BLUE WATER GAS.
D. VERTICALS, MODERATE STEAMING.
E. VERTICALS, NON-STEAMING.
SELLING PRICE OF COKE, SHILLINGS PER TON.

vantage over "B" system is 2·5d. per 1000 c.ft.; and at 35s. per ton it is 5·2d. The comparison of "B" (horizontals) with "C" (horizontals and 25 p.ct. blue water gas) is interesting. For prices up to 22s. per ton, "B" has the advantage. But at this price the graphs cross, and "C" has the advantage, which, at 35s. per ton, amounts to about 0·9d. per 1000 c.ft. For all values of coal and coke, "A," "D," and "E" (verticals, high, moderate, and non-steaming) show considerably less costs than "B" (horizontals), or "C" (horizontals and blue water gas) for net cost of coal.

Chart 4.—Coal constant at 30s.; coke, at varying prices.

For all coke prices up to about 37s. per ton, "A" (verticals, high steaming) shows the lowest net for coal, then for all coke prices above 37s. "E" (verticals, non-steaming) comes out lowest; also up to 32s. 6d. for coke "C" comes out lower than "B." But above 32s. 6d. for coke, "B" gives a lower cost than "C."

Chart 5 is worked out for coal at 32s., and Chart 6 for coal at 34s. per ton.

The average net receipts per ton of coke, breeze, and dust is not likely to exceed, as a general rule (say), 90 p.ct. of the cost price of coal per ton. Reading off from Chart 4 (coal constant at 30s.) the figures corresponding to coke at 90 p.ct. of 30s. = 27s., the following results are obtained:

"A," Verticals, high steaming	7·3d. per 1000 c.ft.
"D," Verticals, moderate steaming	8·9 " "
"E," Verticals, non-steaming	10·0 " "
"C," Horizontals and blue water gas	11·2 " "
"B," Horizontals	12·2 " "

In a similar way from Chart 6 (coal constant at 34s.) the following results for coke at 90 p.ct. of 34s. = 30·6s., are obtained:

"A"	8·6d. per 1000 c.ft.
"D"	10·6 " "
"E"	12·2 " "
"C"	13·0 " "
"B"	14·4 " "

It must be distinctly understood that the results given relate only to the net cost of coal per 1000 c.ft. of gas, irrespective of the quality of the gas. Having regard to the present tendency towards selling gas on a B.Th.U. basis, it is vital to determine how coal and coke, &c., prices, labour, distribution, and standing charges affect the cost of B.Th.U. to the consumer. It is evident that coal is saved by substituting in part blue water gas for coal gas; but it does not necessarily follow that by so doing gas-works can deliver B.Th.U. at a cheaper rate.

The writer has investigated the cost of British thermal units delivered to the consumer, and hopes to publish the results in diagrammatic form in the near future.

Combined Receipts for Tar and Liquor by Various Systems.

System.	Receipts from Tar and Liquor. 200 Million C.Ft. of Gas Made from Detailed Cases Worked Out Previously.	Receipts from Tar and Liquor. Per 1000 C.Ft.	Effect on Net for Coal per 1000 C.Ft. of a 10 P.Ct. Alteration of Tar and Liquor Prices.
	£	d.	d.
"A," Verticals (high steaming)	2670	3·2	0·3
"B," Horizontals	3592	4·3	0·4
"C," Horizontals and 25 p.ct. blue water gas	2696	3·2	0·3
"D," Verticals, moderate steaming	3425	4·1	0·4
"E," Verticals, non-steaming	4252	5·1	0·5

From the above it will be seen that a 10 p.ct. alteration in the prices of tar and liquor causes an alteration in the net for coal per 1000 c.ft. of 0·3d. to 0·5d. So that, when comparing one system with another, the greatest variation caused by this 10 p.ct. alteration amounts to only 0·2d. per 1000 c.ft., which is small compared with the effect of a 10 p.ct. alteration in coal prices, when comparing two systems.

WATER-GAS MANUFACTURE IN A SMALL GAS-WORKS.

By J. W. GIBSON, of Budleigh Salterton.

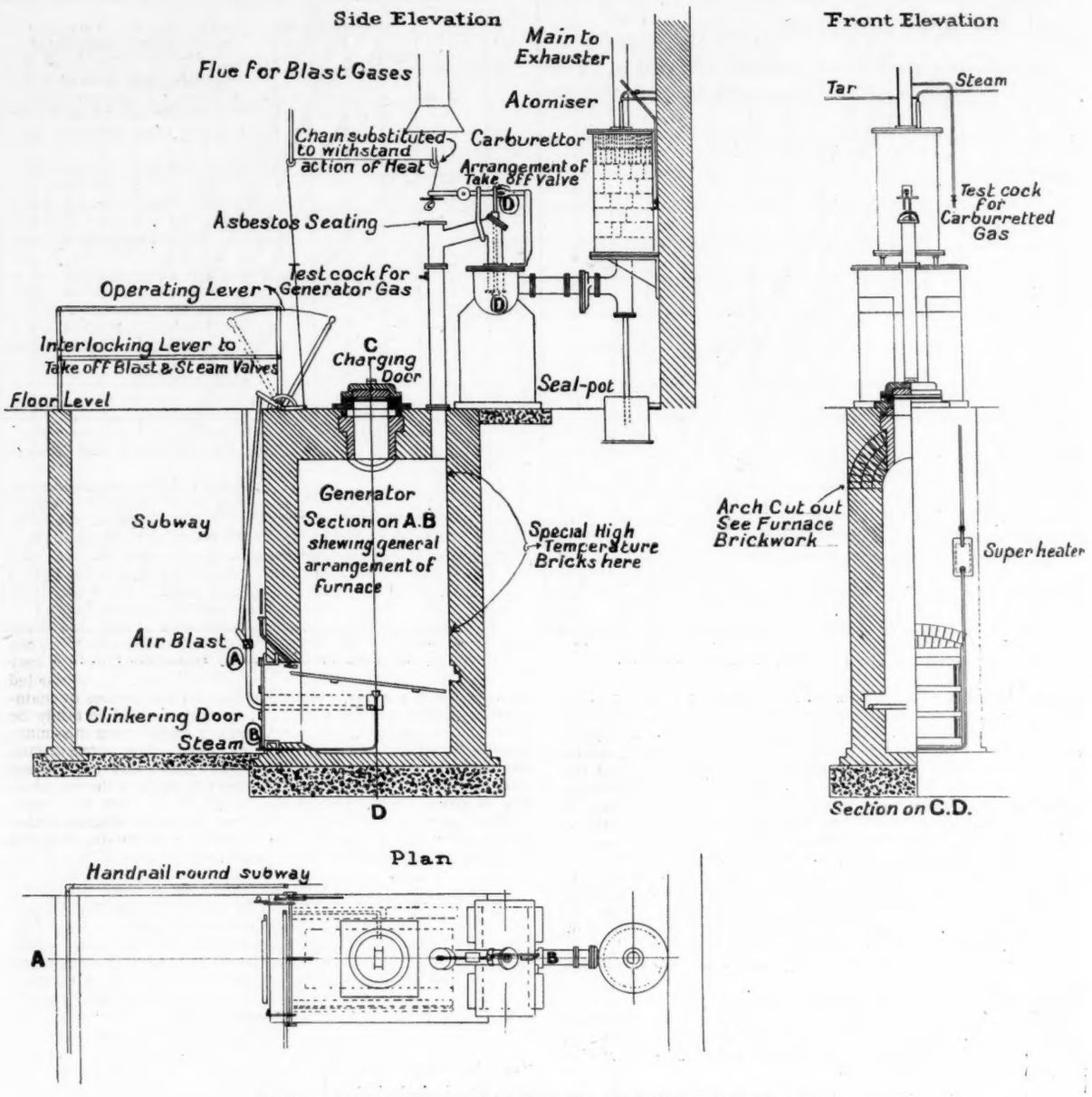
IN view of the multitude of papers, articles, &c., appearing in the Technical Press, the writer thinks that no apology is necessary in submitting the following.

A start was made with water-gas manufacture in the early part of 1918 with a plant on the converted producer principle. But, owing to the heavy fuel costs, together with the bad arrangement of the plant in general, this method had to be abandoned, as not being a paying proposition. The experience gained in working the plant was, however, a valuable guide in designing and erecting the new plant as described later. The writer holds the opinion that some form of enrichment is necessary for success—both from the manufacturing and the distribution side of the question—as no doubt in the near future the next question to receive attention will be the corrosion of mains and services with their attendant evils, by omitting the enrichment.

To save initial outlay, it was necessary for the cost of a suitable plant to be cut-down to the lowest net figure; and, to meet the conditions of labour in a rural district, it was also necessary that the plant should be as simple as possible in construction and operation. By the illustration it will be seen how the desired result was attained. Further, as a practical proof, it may be said that the plant has now been in continuous operation for the past two months without the slightest hitch.

In the writer's opinion the twin type of generator, as illustrated, is the ideal plant, as the manufacture is continuous.

From experience gained in water-gas manufacture, it has been found necessary to secure a good gas, to insist on a deep fuel-bed, and in designing and erecting the plant this was borne in mind, together with the following factors: (1) Simplicity in construc-



THE "SIMPLEX" CARBURETTED WATER-GAS PLANT.

tion. (2) Standardization of all parts of the plant. With the exception of the furnace brickwork every part is standardized—thus there is no delay in replacements.

The plant, as outlined, was erected by our own staff with the assistance of a bricklayer's labourer for the brickwork. As the space was available, it was utilized; but the plant could well be arranged in the place of an ordinary coal-gas setting either in the single or twin type, and the size of the generator or generators would be arranged according to the output required.

As a proof of success in working, the following results are given, not at the expense of the coal stock but to illustrate everyday working with the aid of water gas manufacture in a 12 million per annum gas-works.

Tests of a "Mixed Gas, Water Gas," Plant, Working in Conjunction with Coal Gas Manufacture.

Seven days weighed test from the 19th to the 26th of September, 1919, both days exclusive.

Coal carbonized	9 tons 6 cwt.
Coke used	1 ton
Total gas made	184,500 c.ft.
Make per ton of coal carbonized	19,800 ,,
Water gas made	72,900 ,,
Tar used for enrichment	10 gallons

Residue from enrichment saleable as dehydrated tar.

It may be noted that the class of coal carbonized was Somerset 65 p.ct. large. As there were no means of separately registering the water gas made, the make of gas per ton of coal is assumed at 12,000 c.ft. per ton, which is exceptionally high for the class of coal mentioned.

For Capacity per Hour Single Generator Type.

Date,			
Nov. 2, 1919.	Time starting, 10·0 a.m.	Meter index,	45,402 c.ft.
,, ,,	,, finishing, 11·0 ,,	,, ,,	45,437 ,,
Gas made			3,500 ,,

Five minutes blow, ten minutes make.

Weekly Make per Ton of Coal Carbonized since Starting-up the New Plant.

Week Ending—		
Sept. 19.	19,100 c.ft.	Period of threatened railway strike, &c.
,, 26.	19,803 ,,	,, ,, ,, ,,
Oct. 3.	21,300 ,,	Railway strike
,, 10.	18,300 ,,	,, ,,
,, 17.	18,200 ,,	,, ,,
,, 24.	18,500 ,,	
,, 31.	18,700 ,,	
Nov. 7.	18,300 ,,	
,, 14.	18,400 ,,	
,, 21.	18,300 ,,	

In conclusion, the writer wishes to record his appreciation of the help afforded him by Cpl. R. L. Wyman, 1st Australian Tunnelling Company, of the staff of the South Australasian Gas Company, in the work of preparing the drawings and making the tests, &c., during three months' leave that he spent with the writer prior to re-embarkation.

National Association of Technical Gas Officials.—We are informed that a small Committee has drawn-up the rules and constitution of the new Association of Technical Gas Officials; and they are now in the hands of the General Committee for consideration. It is hoped that a meeting of members will be called early in the new year.

MIDLAND JUNIOR GAS ASSOCIATION.

The Midland Junior Gas Association had a meeting on Thursday evening, at the Council House, Birmingham, to hear a paper by Mr. J. W. Wood, M.Sc., Research Chemist, Fuel Department, Leeds University. Mr. C. CARRINGTON BARBER (the President) was in the chair. There was only a moderate attendance of members.

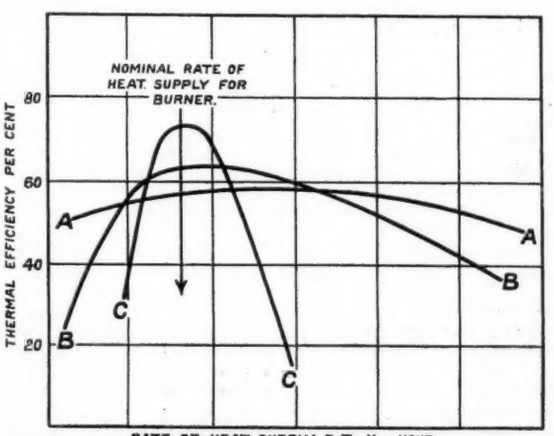
Mr. WOOD proceeded to read his paper on:

EFFICIENCY AND THE EFFECT OF INERTS UPON THE THERMAL EFFICIENCY IN USE OF COAL GAS.

The question of inerts is one which has been discussed upon several occasions during the past three or four years by this Association. As you may be aware, the Gas Investigation Committee of the Institution of Gas Engineers, through the medium of its Research Sub-Committee—a Joint Committee of representatives of the University of Leeds and of the Institution—have been subjecting the same question to experimental investigation. It may be advisable, in the first place, to make a few remarks on the subject of efficiency testing in general. Though it is possible to travel a considerable distance with certainty by means of our knowledge of the physical, thermal, and chemical properties of gases, it is found that, even in the simplest uses to which towns' gas is applied, the available data are not sufficiently complete to enable one to say beforehand what will be the exact result in any but a few cases. Several theories which receive support in different quarters fail to agree with the observed facts, not because they are fundamentally wrong, but because they account for only part of the phenomena attendant upon the combustion of gas. Indeed, this estimation of the relative importance of the different factors involved is a most difficult matter. The phenomena are as a rule so complex that appeal to experimental inquiry is the only satisfactory course.

Until comparatively recent times, one could not have made the statement without very serious opposition; but the trend of opinion to-day is that the majority of gas consumers desire to purchase not gas, but energy in the form of heat units or B.Th.U., and this is the key to the proposed regulations for the control of gas quality. The number of heat units taken by the consumer is clearly the product of the calorific value of the gas and the number of cubic feet supplied. Strictly speaking, however, gas undertakings do not supply heat units, but only the means of generating heat units; and if the consumer fails to generate the whole of the potential heat units supplied to him, or, having successfully generated them, fails to apply them properly, a loss of efficiency will be entailed. The term "efficiency" is subject to many interpretations; but in the present paper it will be restricted to "thermal efficiency"—*i.e.*, the ratio of the heat units usefully employed to those actually supplied in the same time. The thermal efficiency is not a physical constant of a gas like its specific gravity or calorific value, although typical values may be selected for a few well-defined operations, such as water boiling and gas fire heating for each grade of gas.

Another difficulty also arises; for the efficiency must be referred to some particular operation and some particular form of appliance or burner. Thus it is found that if the calorific value of a gas is altered, there is frequently an alteration in thermal efficiency, even though matters have been arranged so that the same rate of heat supply is maintained and the disposition of apparatus is in both cases identical. Is this change in efficiency due to inherent properties of the gas itself, or is it due wholly or in part to unsuitability of the appliances for one or other of the gases?



When the difference is considerable, examination of the appliance will usually indicate whether or not any material improvement can be effected by modification of the appliance. For this reason, taking water boiling as an example, tests made upon the same burner with the same vessel, with the same weight of water, and at the same B.Th.U. rate, and styled by some "Standardized Tests" or "Strictly Comparative Tests," cannot finally approve of or condemn a certain quality of gas, since the suitability of the burner for the gas is also involved. On the other hand, it is rather anticipating the results of an investigation to assume that, given suitable appliances, the same thermal efficiency would be attainable with all grades of gas. The matter cannot be decided upon theoretical considerations, but only by most extensive experimental work.

Then, again, the maximum thermal efficiency reached with a given appliance may not be a fair index to the usefulness of a given quality of gas for general purposes. Ease of manipulation, convenience, and the range over which the efficiency is reasonably high must all receive due weight. For example, three typical efficiency curves are indicated; and it will be noted that in each case there is a point of maximum thermal efficiency, that the respective maxima do not occur at the same rate of heat consumption, nor do they necessarily coincide with the normal rate of heat supply for which the burner was intended. As indicated above, this may be due to the fact that the gas with which the tests were made was not that for which the burner was originally designed and adjusted by trial to give the highest efficiency.

For A, the curve is flat, and the maximum is not at all well defined—*i.e.*, substantially the same efficiency is attainable over a wide range of B.Th.U. rate; and a burner with this characteristic curve would be eminently suitable for the erratic and variable conditions of domestic use.

In B, it is seen that excess of gas (within limits) causes less loss of efficiency than shortage of gas. The curve might be taken to indicate the low thermal efficiency of the incandescent mantle or of the gas-fire when turned down, and points to the economies of smaller mantles having their full gas supply where the light of a full-size mantle is not required, or to the advantages of the duplex burner for the gas-fire. The thermal efficiencies in the two latter cases are not of the absoluted values indicated on the diagram.

Curve C represents the results obtained with at least one recent type of burner. The maximum efficiency is undeniably high; but it will be noted that the efficiency is maintained over a very narrow B.Th.U. range. For a well-defined operation conducted under skilled supervision, the efficiency could doubtless be maintained; but for general use, my preference would certainly be for the conditions of Curve A, with its somewhat lower maximum thermal efficiency but greater working range. The above discussion of the character and usefulness of efficiency curves has been entered into, in order to show that there is more in the examination of gases than merely boiling a kettle of water with each grade of gas, and that a high thermal efficiency attained under special conditions as regards control and rate of working may not be really representative of the usual performance either of the gas or of the appliance.

At one time it was expected that, as the result of the labours of the Gas Investigation Committee, it would be possible to say that a gas of such and such composition and calorific value would yield the highest thermal efficiency in use, and that other gases could then be assessed according to the closeness with which they approached this quality. This expectation must now be entirely abandoned. The exigencies of war and of strikes have caused experiments to be made with different qualities of gas on a scale that would barely have been contemplated by the most unorthodox of gas managers. It cannot, however, be said that all the grades of gas supplied have been equally satisfactory—in fact, some are most undoubtedly unsatisfactory. Nevertheless, careful tests show that a reasonably high thermal efficiency is attainable over a very wide range of composition and calorific value. Moreover, thermal efficiency is not the only efficiency to be considered; and cost of production, type of plant, and nature of the coal available as raw material will influence the quality of gas produced for the best all-round efficiency.

The stagnating and restrictive effects of the old illuminating power standards are so well known that it is almost superfluous to point out that, in any new regulations which are framed, the gas quality should not be controlled by its application to one particular use, to the exclusion of all others, although reasonably good performance is to be expected in any use to which gas is applied. Whatever local conditions shall decide as to the most economical grade of gas for a particular district, uniformity of quality for the district cannot be too strongly emphasized. The means of adjustment to appliances provided by the makers are rarely sufficient to cope with wide variations in gas quality, and in any case there is usually some difficulty in explaining to a non-technical user the precise function of an adjustment. The only rational course is to send out the appliances from the gas-works properly adjusted to give the highest thermal efficiency with the local gas under normal conditions, or to employ an efficient visiting maintenance staff. In either case uniformity of the product sent out from the gas-works is essential if such adjustments are to be satisfactory and permanent—*i.e.*, there should be no necessity for frequent readjustment of the kind involving skilled labour.

In considering a change in gas quality, a reduction in calorific value is the usual problem to be faced; and there are two main types of reduction. Supposing we wish to produce gas of 400 B.Th.U. gross. This may be done by taking straight coal gas at (say) 600 B.Th.U. gross and mixing it with twice its volume of blue water gas at 300 B.Th.U. gross—*i.e.*, the mixture will have a calorific value of 400 B.Th.U. gross, and will be almost entirely combustible. As far as thermal efficiency in the use of gas is concerned, it is immaterial whether the mixture is made by steam-

ing in the retort or by the admixture of blue water gas from a separate generator. This method of reducing calorific value is most interesting, and promises possibilities of coal conservation and other advantages. It must, however, be left alone this evening. The other type of reduction is that practised by works possessing no auxiliary means of producing combustible gas of low calorific value, and consists in mixing the coal gas with incombustible material of no calorific value.

The use of producer gas for dilution falls in between these—in fact, in different works there are almost imperceptible gradations between the two extremes. So long as this incombustible material can be sold at the price of combustible gas, the temptation to indulge in its addition will always be present.

The substitution of a selling price based upon the B.Th.U. represented by the gas at once removes this incentive; and the question naturally arises as to whether the addition of incombustible matter—the so-called "inerts"—exerts any effect upon the efficiency in use.

It is unnecessary to resort to experiment to determine the effect upon the specific gravity of mixing inerts with coal gas, since this can be easily found by calculation. Below is given a table showing the effect of mixing a coal gas of ·45 sp. gr. with various percentages of inerts of an assumed specific gravity 1·10, and it is assumed that such coal gas will contain 10 p.ct. of inerts.

Percentage of Inerts in Mixture.	Specific Gravity of Mixture.	Gross Calorific Value. B.Th.U. per C.Ft.	Relative Volume of Gas Required to Deliver the Same Number of B.Th.U.
0	0·378	—	—
10	0·450	600	1000
20	0·522	540	1111
30	0·595	480	1250
40	0·667	420	1433
50	0·739	360	1666
60	0·804	300	2000

The rapid increase in specific gravity as the "inerts" are increased will be noted; and for the same B.Th.U. delivery the volume of gas to be supplied is shown in the last column of the table. Owing to irregularity in mixing, there will be difficulty in maintaining constant specific gravity; and therefore the first requirement for good performance—uniformity of product—will be absent, in this respect at least. A few simple calculations will show that it is not a practicable proposition, in the case of gases with the higher inerts, to use appliances without alteration, and to attempt to deliver the number of B.Th.U. formerly delivered by means of gas of higher calorific value by increase of pressure. When supplied with gases of high calorific value, the general run of appliances will pass too much gas, or rather, more B.Th.U., than can be properly utilized, if the regulating taps were opened fully. The waste due to this cause has in general been exaggerated. Reduction in the calorific value, but using the same gas nipples and pressures naturally reduces this waste. But the point is soon reached where we are no longer reducing the marginal waste, but are encroaching on the useful possibilities of the appliance; and even if the efficiency is slightly increased, the rate of working may be unnecessarily reduced.

In many cases where complaints as to gas quality are made, the real source of the trouble is insufficiency of quantity, because sufficient B.Th.U. are not supplied, and the flames are neither long enough nor large enough to fulfil their functions properly. The alternative plan is to retain former pressures, but open-out nipple orifices to secure the passage of the increased volume of gas necessary to deliver the same number of B.Th.U. In general, this is successful. Enlarging these orifices, however, reduces the injector efficiency; and this method of working is only permissible because the air requirement per cubic foot of gas is reduced when the gas is mixed with inerts. Experiment shows that it is quite possible to open-out nipple orifices so that gas requiring only 2·5 c.ft. of air per c.ft. of gas (against 5 to 6 c.ft. for straight coal gas) suffers from imperfect aeration.

If I were asked what I considered to be the main reason for inefficiency with ordinary burners when using straight coal gas of high calorific value and low inerts, I should say that, next to waste owing to the use of too much gas, imperfect aeration was the trouble. The matter has been discussed in great detail in the Press; and a very large part of the William Young Memorial Lecture delivered this year was devoted to demonstrating that as the calorific value of a gas is reduced, its air requirement per cubic foot is in general also reduced. In the case of mixing incombustibles (which require no air at all) with coal gas, it should be self-evident that 1 c.ft. of the diluted mixture will require less air in exact proportion to the dilution.

The inference, therefore, is that, since the diluted gas requires less air, it will stand a better chance of attaining full aeration than the undiluted gas. It is, however, unjustifiable to advise dilution to a considerable extent on these grounds, or to attempt to deduce the behaviour of the mixture during combustion from such meagre data. For supposing the straight coal gas suffers under-aeration to such a degree that the addition of inerts to the extent of 10 p.ct., and consequent reduction of the air requirement by 10 p.ct., will render aeration satisfactory, as frequently occurs in practice, it does not follow that an increase of inerts to 20 p.ct. will produce further improvement. The fact that air-shutters have to be partly closed when the calorific value of coal gas is reduced below (say) 500 B.Th.U. gross by the addition of inerts, is evidence that full aeration is satisfactorily and easily attainable in the majority of cases, and there is little or no advantage in having more than a very moderate percentage of inerts present.

So far we have only been concerned with the mixture of gas and air which must be brought together to form a combustible mixture. Given the requisite number of heat units, most people are interested in that elusive quantity the "calorific intensity," the "intensity of combustion," or the so-called "flame temperature." In nearly every known case the gas will be consumed by the use of air, of which the oxygen alone is the active agent. The nitrogen associated with the oxygen is as truly an inert, in the final combustible mixture, as that mixed with the original coal gas as inerts, and in the same sense. The presence of this nitrogen cannot be avoided, and it has the effect of rendering the inerts in the original gas relatively less important.

Suppose, for example, two extreme cases are taken:

I.—1 c.ft. of a straight coal gas of 640 B.Th.U. gross per cubic foot, and requiring 5·4 c.ft. of air for its complete combustion. The mixture of the two gases will give a total of 6·4 c.ft., equivalent to 100 B.Th.U. gross per cubic foot of mixed gas and air.

II.—The same gas diluted with an equal volume of nitrogen. The air requirement will now be only that necessary for the 0.5 c.ft. of combustible gas—*i.e.*, 2·7 c.ft. of air. The total volume of mixture therefore becomes 0·5 c.ft. combustibles + 0·5 c.ft. nitrogen + 2·7 c.ft. air = total 3·7 c.ft., and capable of generating the B.Th.U. corresponding to the 0·5 c.ft. of combustibles—*i.e.*, 320 B.Th.U. This is equivalent to 86·5 B.Th.U. per c.ft. of mixture.

I have purposely chosen a case of gross adulteration. When dealing with gases over a very wide range of quality from carburetted water gas and straight coal gas down to blue water gas, as well as mixtures of these gases in different proportions, it is a curious coincidence that 1 c.ft. of mixed gas and air—*i.e.*, of any of the above gases together with the air theoretically necessary for its combustion—represents substantially the same number of heat units, the value of which ranges between 95 and 100 B.Th.U. gross per cubic foot. The conclusion usually drawn is that no radical alteration in the mixing chambers and jets of burners is necessary for use at the same B.Th.U. rate, even though the calorific value of the gas be reduced, since the same total volume of gas and air is to be dealt with for the same number of B.Th.U. [Jets here does not refer to the injector nipples, which require modification as already indicated.]

From Example II. it is evident that this rule breaks down if inerts are present in any considerable quantity. As a matter of fact, the curve showing the relation between the percentage of inerts and the B.Th.U. per cubic foot of resultant theoretical gas-air mixture is not quite a straight line; and if we consider, as Case III., a gas similar to the first, diluted with one-third its volume of nitrogen—*i.e.*, 25 p.ct. of N_2 in the coal gas-nitrogen mixture—the B.Th.U. per c.ft. of theoretical gas-air mixture falls to 95 B.Th.U. gross, and not to 93 B.Th.U. gross per c.ft., as might be inferred from the calculation given for 50 p.ct. nitrogen.

It is not my object this evening to defend the addition of inerts to coal gas; but it is worth while noting that 25 p.ct. of inerts in the gas does not drop the B.Th.U. per c.ft. of gas-and-air mixture by 25 p.ct. (the view popular among many consumers), but only by some 5 p.ct.; the difference being caused by the overwhelming effect of the nitrogen introduced with the air necessary for the combustion of the gas. It has been suggested that the number of B.Th.U per cubic feet of theoretical gas-and-air mixture is proportional to the "calorific intensity" or to the "flame temperature;" and the quantity has been used in discussions. Neither this quantity, nor one which is to be preferred to it in some respects—viz., B.Th.U. per cubic foot of the products of the combustion—is of use for any but the roughest comparisons, since it assumes what is not strictly correct—that the specific heat of a unit volume of the products of combustion is constant, with the variations in composition usually encountered.

It may be superfluous to point out that for most purposes a statement of the properties of gases as a function of volume, or per cubic foot, is the most convenient method in the gas industry. When dealing with questions of flame temperature it is necessary to deal with the product of temperature, specific heat, and weight of the gaseous products of combustion; and the calculation of a theoretical flame temperature is tedious, and the result must differ considerably from the actual flame temperature, which is dependent upon considerations which are not capable of exact mathematical expression, and hence cannot be included in the calculations. The following values will, however, give an idea of the order of the values in some particular cases:

—	Theoretical Flame Temp. °C.	Drop. °C.	Drop expressed as Percentage of Original Temp.
Straight coal gas	1998	—	—
Same gas with 30 p.ct. N_2 in mixtnre .	1915	83°	4·4
" " " 50 " N_2 " .	1840	158°	7·9
" " " 30 " CO_2 " .	1845	153°	7·7

Two things are here noticeable. In the first place, even with

excessive dilution, the theoretical flame temperature has not been reduced by 10 p.c. of that possible with the original gas; and in the second place, there is considerable difference between equal percentages by volume of CO_2 and N_2, when present as inerts. Although it is possible to detect it by careful tests, this difference between CO_2 and N_2 has been unduly exaggerated; and it should be remembered that, without going to much trouble, we could hardly introduce CO_2 without many times as much nitrogen in the ordinary gas-works—*e.g.*, by over-pulling. So that where inerts are present in quantity, it is permissible, for all practical purposes, to treat the whole as nitrogen, except in critical cases where the border-line between permissible practice and prohibitive qualities is being reached.

It now becomes clear why water-boiling tests have given such consistent results on a B.Th.U. basis over a wide range of gas qualities, both with and without inerts. The drop in temperature head brought about by the introduction of inerts is so small that it could hardly be detected by its effects in a test of this nature. In other words, the test is so lenient that it may be dangerous to argue about other uses of coal gas from the data it provides, although it is granted that the results obtained are valid and provide most useful information with respect to a very considerable class of domestic operations.

Are there any other uses of coal gas in which a drop of 100° to 150° C. in flame temperature would not be a negligible matter? Unfortunately, I am not in a position to quote the results of tests in this direction; but it is a fact that for the incandescent mantle even though the B.Th.U. be supplied at an appropriate rate, there is a falling off in illuminating power, if the inerts are unduly increased. It is possible, however, to add 25 p.ct. of inerts to a straight coal gas without depreciating the performance of the gas so badly as to make it commercially impracticable. This is about as far as we can go on theoretical considerations only.

A number of important factors still remain which are not capable of mathematical expression, and which can therefore only be determined by experiment. Thus, how closely do the actual flame temperatures approach the theoretical? If the temperature of the flame is not uniform, what is the nature of the distribution? What is the effect of a given percentage defect or excess of air upon the flame? How closely can we approach to the theoretical full aeration, with a given appliance without backfiring? Then, again, in the case of the incandescent mantle it is necessary to obtain not only the requisite quantity of heat or total B.Th.U., but intensity, corresponding to the flame temperature. In addition, the flame must be of such size and shape as to correspond with the mantle; otherwise the result will be poor, even though the flame possess the requisite temperature for giving a high illuminating efficiency. All this points to the necessity for further experimental work, and then—more experiments.

It would hardly do to leave the subject without reference to the addition of air to coal gas. Such air contributes nothing to the calorific value, and, so far as specific gravity and calorific value per cubic foot of "gas" distributed are concerned, may be regarded as substantially the same in effect as an equal volume of nitrogen. For the appliances which fail to give satisfactory aeration with rich gases, such as straight coal gas, it would seem to be an obvious remedy, for the demands for primary aeration will be reduced by the amount of air added. In adding air, we are not adding anything to the gas which would not be finally mixed with it before combustion was completed, and therefore the flame temperature would not be reduced by such addition.

When subjected to actual test it is found that the addition of small amounts of air to straight coal gas does improve the thermal efficiency if conditions are such that the appliance was formerly suffering from defective aeration. Beyond the point at which the burner itself is capable of injecting all the air required, however, no advantage is gained by the addition of air. It must also be taken into account that there are risks attendant upon the mixture. It is not suggested that any undertaking would send out gas-air mixtures nearing the explosive limit; but there is always the possibility of failure of the mechanism regulating the admixture of gas and air, in which case local irregularities or "streakiness" of the gas mixture may occur, parts of which may reach the danger limit. Further, in the presence of CO_2, water vapour, oxygen, and a fluctuating temperature, we have all the factors present for vigorous corrosion and stoppage of meters and services. Upon the ground of thermal efficiency in use, this addition of air may be justifiable; but on all other grounds it is best excluded. Again, conclusions with regard to "inerts" which are based upon the addition of air to coal gas will not agree with those based upon the addition of inerts other than air, since the effects upon the combustible mixture are totally different. This calls for caution in interpreting results given as demonstrating the influence of inerts upon the behaviour of gases, where the character of the inerts as well as their quantity are subjected to variation at the same time.

The admission of inerts to a gas is practically unavoidable, and to a certain extent it may be regarded as commercially advantageous, because the ingress of a definite amount of inerts at the retort means less likelihood of loss of valuable coal gas to the settings. Given suitable burners, the improvements as regards thermal efficiency in use brought about by the reduction of inerts from (say) 10 to 5 p.ct. would probably be more than counterbalanced by the extra cost of working to secure this end. Also, many existing burners could not use gas with 5 p.ct. of inerts to as great advantage as that with 10 p.ct. of inerts. Therefore the point of producing the richer gas is largely discounted. In certain economic conditions there seem to be considerable advantages in reducing the calorific value of a gas, even as low as 400 B.Th.U. gross per c.ft., provided it is done in such a way as to be conducive to coal conservation. There is, however, no coal conservation effected by the reduction in the calorific value of coal gas by the introduction of inerts in quantity. Unless a sliding-scale were arranged which favoured gases of low calorific value, there would be no commercial advantage in increasing inerts when selling on a B.Th.U. basis. The limits as regards inerts which would be reached with reasonably good working for straight coal gas practice are, probably, lower than is actually permissible before the thermal efficiency in use is so reduced as to be prohibitive—at least, as far as domestic use is concerned.

On the whole, therefore, if selling upon a B.Th.U. basis, it would seem to be the best practice commercially to restrict inerts in otherwise straight coal gas practice, quite apart from any legal compulsion in the matter; and if the calorific value of gas is to be seriously reduced, it is fundamentally wrong to bring about this reduction by the use of excessive quantities of "inerts." It cannot be too strongly emphasized that this paper is not intended as a survey of the properties of gases of reduced calorific value as a whole, but only mixtures of a special type, in which the reduction of calorific value has been brought about chiefly by the introduction of "inerts."

In conclusion I must tender my thanks to the Research Sub-Committee for permission to read this paper; I believe that the views expressed are fairly substantiated by the experimental work which it is my privilige to carry out for the Institution. At the same time, the views expressed are my own personal views and, as such, cannot necessarily be regarded as the accepted opinions of the Gas Investigation Committee, which has this and other aspects of the question of gas quality under its consideration.

DISCUSSION.

The PRESIDENT moved a vote of thanks to Mr. Wood for his excellent paper, and referred to his point as to relative uniformity in the quality of gas. This could not be too strongly emphasized. The recent reduction in the quality of gas was not a recommendation by the Government, either for commercial or for increased efficiency, but was due to an emergency order for the conservation of coal. Therefore the results obtained must not be taken as indicative of the utility of low calorific value gas, since the reduction was brought about mainly by the introduction of inerts and not by blue water gas.

Dr. E. W. SMITH (Chief Chemist to the Birmingham Corporation Gas Department), seconding the motion, said it was important for those who published the results of tests to give the fullest and minutest details of the conditions under which such tests were carried out. It was difficult for Mr. Wood or anyone else to meet criticisms of reputable gentlemen who presented figures as a counterblast to what he had reported already, or to question any of his findings, unless these gentlemen had carried out their tests along lines which were truly comparative with his figures. There were few figures that appeared in the Public Press that could be taken as altogether reliable. He did not mean to cast any reflection on the *bona fides* of those who presented the figures; but for comparison's sake it is essential that the fullest details should be given. The paper had brought out the methods Mr. Wood employed in carrying out his tests. He asked the author what was his basis for determining thermal efficiency in relation to the incandescent mantle? It was well known that the radiant efficiency of a bunsen burner was something like 15 p.ct.—but radiant heat was not all available to be converted into light. It would be interesting to have explained the connection between light and thermal efficiency when speaking of the incandescent burner. As to theoretical flame temperatures, it was all very well to have in one's mind the relative theoretical flame temperatures of gases; but it did not do to let their importance loom too great. Even in considering various gases, and in considering the same gas, they knew that it was assumed, in working out theoretical temperatures, that one had a perfect mixture with a theoretical percentage composition of mixture, and that something like the order of explosive condition had to be assumed; otherwise maximum temperatures would not be obtained. It was rarely that such conditions were attained, except perhaps in the gas-engine. Regarding the bunsen burner, only about one-third of the necessary air passed-up through the injector with the gas necessary for complete combustion, and the remainder had to be obtained from the atmosphere outside. The total heat generated would be the same; but the actual temperature obtained varied with the initial aeration. If there were complete aeration, there would be a maximum temperature. With poor aeration there was delayed combustion going on; and this reduced considerably the flame temperature. Even the figures stated might not, in actual practice, be relative—it might be that they did not even show the order of the difference with regard to the effect of inerts. It was possible there might be a much greater difference than was shown by the addition of inerts. On the question of introducing carbon dioxide, important considerations were raised by excessive steaming under poor conditions. If there were not good conditions, instead of forming CO there was formed CO_2 in large quantities. Where poor steaming operations were in vogue, 7, 8, or 10 p.ct. of CO_2 were obtained without an addition of extra nitrogen to the gas. So that bad water gas might conceivably increase the amount of CO_2. The most important side of Mr. Wood's work had yet to be done, in connection with high-temperature conditions—furnace work—because although in furnace work various temperatures were required, ranging from 850° to 1800° C., he thought it would be shown, and proved, that whenever fire-brick had to be heated—whether a high or low temperature was required—the gas producing the highest flame temperature would give the best results even in a low-temperature furnace. It was all a question of head of heat, even though the order of difference might be small. A slight drop of only 4 or 5 p.ct. in flame temperature might be sufficient to decide whether 1710° C. should be

obtained in a reasonable time or not. This little extra fillip that was required in a given design of furnace might not, of course, be obtainable with a little fall like 5 p.ct. Coal conservation could not be the only factor which had to be considered by the gas industry. Perhaps the one question which the gas engineer was asking every other gas engineer was: What is the best gas to make? The cheapest gas to make might not be the cheapest to sell; so that the actual question was, What was the cheapest gas for selling? And coal conservation might not be helped if engineers made a gas which would be the cheapest for selling. This was particularly the case if water gas was to be regarded as a means of reducing the amount of coal used. The average price of making water gas on a thermal basis—if it could be obtained—would be at the present time up to 30 p.ct. higher than coal gas made under reasonably efficient conditions. If this were so, coal conservation was in direct opposition to the economic production of gas at a low cost; and it would not do to advocate *ad lib.* that all those who had not the opportunity of getting figures, or of experimenting, or of obtaining information from their own experience should go wholehoggedly into the question of the production of blue water gas. Each works had to settle the question for itself—after deciding on matters such as raw materials and considerations with regard to plant. This was the only proper way of determining what was the cheapest gas to produce and sell.

Mr. T. F. E. RHEAD (Birmingham) emphasized the complexity of the problem of the mechanism of flame. With industrial gases, the rates of the many complicated reactions varied greatly with aeration—being comparatively slow with some mixtures and explosively rapid with others. As the aeration effected by the injector of (say) an incandescent burner was nothing like sufficient for complete combustion, it seemed probable that inerts would have a greater deleterious effect on the flame temperature and on the thickness of the zone of combustion than would appear from calculations based on the mixture for complete combustion. Alteration in the proportion and nature of the combustibles in industrial gases would have an important effect on the properties of flames and their usefulness for different operations.

Mr. G. TOMLINSON (Derby) inquired as to the term "thermal efficiency" used by Mr. Wood. He asked whether the term "economical efficiency" would not have opened-up a much wider range, and have exposed the question of inerts. For instance, in making a photometer test of an incandescent burner, by increasing the gas consumption it was possible to increase the efficiency of the lighting—maximum candle power; but what about the candle power per cubic foot? He inquired if Mr. Wood observed the pressure of gas, and if it were constant during the tests whereby he was able to produce the curves of "thermal efficiency." With the majority of gas appliances the admittance of air depended on the velocity of gas through the burner nipple. Also, was it not a question of the area of mixing tubes as to whether perfect combustion was obtained? Again, when the author referred to the "stagnating and restrictive effects of the old illuminating power standards," did he allude to the question of lighting either by flat-flame or incandescent burner? If the former, did he not consider it would be far better to retain a fixed candle power and calorific valve, so that the various makers of flat-flame burners would know at what efficiency they were to aim—the ratio of candle power of gas in flat-flame burner to that of the gas in the official argand burner. The rational course was to send out appliances from the gas-works properly adjusted to give the highest thermal efficiency with the local gas under normal conditions, or to employ an efficient maintenance staff. Would it not be better if makers realized the importance of governing the supplies to stoves, fires, &c., so that, irrespective of the variable pressures in the main, the pressure on the outlet of the governor once set would remain constant? The burner nipple could then be adjusted accordingly; so that the velocity of the gas would bring about the induction of air and obtain perfect combustion. It would then be only a question of the stove being kept clean. With a variable quality of gas, adjusters on such appliances would be of advantage, as unskilled persons might then be instructed as to the admission of the required amount of gas. As to vapours in the gas and the corrosion and stoppage of meters and service pipes, surely there was some preparation whereby the inside of the pipes could be coated, and thus protected, as the outside was protected against climatic changes. How many B.Th.U. were required per candle-hour for incandescent burner lighting to give economical efficiency? And was absolute constancy maintained?

Mr. CADWALLADER (Birmingham) urged the importance of keeping the inerts down to the lowest point. He regretted that the duplex burner and taps were apparently less in evidence on gas-fires than formerly. A drop in calorific value meant that more gas was necessary. But in many stoves it was impossible to supply more gas; and the result was that they failed in their purpose.

Mr. RANDELL (Redditch) said a great point had been made as to the effect of inerts on the flame temperature; but it seemed to him that there were many other important considerations besides requiring investigation. Since the advent of low-grade gas, he wondered whether the actual volume of flame was desirable, and whether the thermal efficiency of the oven was dependent on the volume of the flame, or could the best results be achieved by a relatively short and hot flame. No one wished to put inerts into gas to make money; and it was important to recognize that the addition of inerts must not be confused with the question of a low-grade gas.

Mr. WOOD, in reply, pointed out that, in testing different qualities of gas, it was necessary in the first place to carry out tests under selected uniform conditions. If it were found that the efficiency had fallen off, before saying that the gas was no good, an alteration should be made in burners, &c., so as to get the best out of the gas by trial. As to flame temperature, he mentioned that two years ago at a meeting of the Institution the report of the Gas Investigation Committee was somewhat criticized for apparently depreciating the effect of flame temperature on efficiency in use. It was thought that they made too little of flame temperature. At the present meeting, it would appear that the speakers had gone too much in the other direction. The only reason for calling attention to it was because it was something they could calculate. He was quite prepared to admit that other things were far more important. A gentleman prominent in the gas industry undertook that he could make any flame fit any mantle by altering the degree of aeration and gas consumption. He (Mr. Wood) had not been successful in doing this, since each gas mixture gave a definite shape, which did not always agree with the shape of the mantle, no matter how aeration or gas tap was altered. With the present appliances it was commonly believed a gas of low calorific value carrying inerts burned with a shorter flame than a gas without inerts. According to theoretical considerations, the addition of inerts should reduce the rate of reaction or combustion, and the flames should therefore travel further before combustion was complete—*i.e.*, the flames ought to be larger. As a matter of fact, the latter was actually the case when gases with and without inerts were supplied at the same B.Th.U. rate. But a consumer was not getting heat units through the appliances at the former rate; and the reduced size of flame was due to the reduced quantity of heat units or thermal equivalent of gas, although he was getting a greater number of cubic feet. A flame of gas with a considerable quantity of inerts was larger than a straight cone gas-flame which was burning at the same B.Th.U. rate for the same degree of aeration. There were plenty of reported analyses in which they obtained 7, 8, and 9 p.ct. of CO_2, with nitrogen 6, 7, and 8 p.ct. Such mixtures in which the CO_2 was equal to or greater than the N_2 present had been obtained by steaming in vertical retorts—a method of working which had been definitely omitted from the evening's discussion. Unless the dilution was considerable, if they plotted on a B.Th.U. instead of a cubic foot basis, the candle power curves for an upright incandescent gas-burner coincided substantially with the original curve for straight coal gas—the maximum candle power being slightly reduced. This of necessity meant that the candles per cubic foot must fall if the gas quality were reduced, even slightly, but was quite unimportant when considering gas on a B.Th.U. basis. He was not at all sure that a governor on the inlet meter would solve distribution troubles; though it would get rid of fluctuating pressures. It would not solve all difficulties; since, even with a uniform pressure, differences in the number of B.Th.U. delivered would be obtained with variations in the specific gravity of the gas. As to air adjusting, he had complained of defective aeration with burners; but the makers always insisted that there was plenty of adjustment. In point of fact, after opening many air-slides very slightly, additional opening produced no further result; so that a large travel on the air-slide was quite illusory as to the real amount of adjustment it provided. With regard to the flat-flame burner, the calorific standard was no good for indicating the usefulness of gas in such a burner; and even a candle power standard was not reliable, since the results with the argand and flat flame differed greatly if the gas departed far from pre-war qualities. The consumer complained of inerts in the gas. The real trouble, however, was not inerts, but an insufficient quantity of B.Th.U. Even with a pressure of 20-10ths, and with nipples opened-out adequately, the services and meters were frequently too small for the volume of gas they were called upon to pass. The theoretical flame temperature of blue water gas was only a few degrees higher than that of straight coal gas. The thermal efficiency in use of mixtures of blue water gas and coal gas, supplied at the same B.Th.U. rate, should be practically the same; but actual tests did not give quite the same figures—there was a fall as the calorific value dropped. It was believed that this drop might be recovered by suitable modifications in the burner. Efficiency was the joint efficiency of burner and gas; and without further experimenting as to the most suitable burner for any grade of gas, it was unfair to pronounce a final opinion on any grade of gas.

Baking with Gas.

Special attention has been paid to the subject of commercial baking with gas, by the Portland (Ore.) Gas and Coke Company; and in the "Gas Record" of Chicago, Mr. Harold S. Babb has furnished a description of the results achieved. It having been decided that among the smaller suburban bake-shops, the direct-fired Dutch oven offered the greatest prospect of success, efforts at the start were concentrated in this direction. The most successful installation was at a small wholesale shop in which an oven of this character was fired directly by gas through the working door. With a motor and blower, gas was supplied to a four branched burner. This installation, which has been in use for eighteen months, has proved very satisfactory both from an operating and a cost standpoint. The system of firing Dutch ovens through the baking-door was adopted for subsequent installations, using the ordinary T injector. In one case of which particulars are given, the motor is ⅛ H.P., driving a 13 in. fan. Gas is supplied through a flexible hose connection. Galvanized sheet-iron is used for the air-line; a slip-joint being provided to allow of swinging the burner out of the way. The vertical drop to the injector is of a 2-in. screw pipe. The nozzle proper is a length of 1½-in. pipe, with a coupling on the end. This screws loosely into the injector outlet, as in some instances the burner will not enter the door with the nozzles in place. The function of the coupling is to give greater range to the flame regulation; and it somewhat spreads the cone of flame. There is no control provided on the air-line; and with a full-open air-line and proper combustion, the air supplied by a 13-in. fan will burn from 800 to 900 c.ft. of 570 B.Th.U. gas per hour. The cost has not been excessive; and convenience, cleanliness, and dependability have been much appreciated.

At the British Science and Key Industries Exhibition in Glasgow, the Gas Department of the Glasgow Corporation are following the example set by them at the exhibition held not long ago in the city, and have a very attractive display of lighting and heating appliances. Furnaces are shown for annealing, reheating, preheating, and hardening steel. There are also gas rivet-fires and brazing installations.

WILLIAM SUGG & CO.'S WORKS VISITED.

Inspection by Members of the London and Southern District Junior Gas Association.

Though it had been fixed for a Friday afternoon (rather than a Saturday), in order that everything might be seen in full operation, there was a muster last week of over a hundred members of the London and Southern District Junior Gas Association, at the hour appointed for an inspection of the works in Regency Street, Westminster, of Messrs. William Sugg & Co., Ltd. The visitors, who were accompanied by the President (Mr. S. B. Chandler), were welcomed by Mr. W. Mattock (the General Manager), Mr. J. Lofts (the Sales Manager), and Mr. H. Waller (the Secretary), who, in guiding the members over the works and explaining to them the different processes, were ably assisted by Messrs. Mogg, Sawyer, Allen, Divine, and Higgs. Indeed, the mention of these names does not fully meet the claim to acknowledgment; the workers themselves in the various shops well deserved the thanks of the visitors (which they received) for their ready response to frequent questions. From beginning to end, in spite of the large numbers, there was a "family party" air about the proceedings.

It was not the first visit of the Association to the works—reference to the "Transactions" revealing the fact that they were there in 1910, on which occasion some historical notes were published in connection with this old-established firm—which date back to 1837, when business was started in Marsham Street, Westminster, by the father of the late Mr. William Sugg. Since the time of the last visit, much has happened. One-half of the time has been spent under war conditions. Messrs. Sugg & Co. were one of the first firms in the gas industry to be controlled; and they were not able to return to their own work until February of this year. Now, however, the making of gas-lamps, &c., is again in full swing. About two hours were spent in the different shops, in all of which there was evidence of the big dimensions of the work now being undertaken by the firm. Early in the round came the testing-room, where there was a fine display of copper and enamelled lamps. This is an important department, for Messrs. Sugg & Co. are most careful that no lamp should go out to a customer without being tested. Then came another testing-room for smaller burners and fittings; the processes of spinning iron and copper, over which some time was spent; and the powerful presses for stamping, which in many cases is possible instead of spinning. Among the other things seen were welding by the oxy-acetylene process; and some splendid automatic machines. The foundry was visited, as well as the blacksmiths' shops, and by the time the show-room—and tea—was reached, the visitors had seen the works from beginning to end.

To all the patterns of lamps on view, it would be impossible to refer; but particular attention was drawn to two types, upon which Messrs. Sugg & Co. are at the present time concentrating much of their attention—the "Littleton" and the "No. 7176." For low-pressure inverted lighting the principle favoured by the firm is the employment of several small mantles, rather than one big one. The results of experience and observation enable them to recommend this plan as being by far the better one, from the point of view both of efficiency and upkeep. The small mantle is heated to incandescence without the least waste; and, furthermore, it is naturally stronger than the large one. Again, it has been found that added illumination is gained from a cluster of small mantles by reflection of one from another. The "Littleton" is an outdoor lamp, fitted with a superheater over the burners, by means of which the gas and air mixture is consumed in a pre-heated condition, in which it is found to give a far higher duty. The No. 2 (or medium bijou size) mantle, having a consumption of about 2 c.ft. per hour, is used; and the lamps are made to accommodate from one to sixteen burners. There is only one gas and air regulator whatever the number of burners may be; a slight turn one way or the other being all that is necessary. The "No. 7176" lamp is constructed throughout on the same principles as the "Littleton," but is intended for internal illumination. It takes three of the No. 2 mantles. Both lamps are of the "look well" and "wear well" kind that has for so many years been associated with the productions of the firm.

After tea, some time was spent in discussing matters relating to lighting by incandescent gas.

Mr. MATTOCK gave expression to the pleasure it had afforded the firm to welcome the Association, and said he hoped the visit had impressed the members with the fact that the whole of the efforts of the firm were devoted to furthering the interests of gas. The founder of the present Company was the late Mr. William Sugg, who in his time did so much for the gas industry. He sowed the seeds of the business; and it had been the endeavour of his successors to follow in his footsteps. He (the speaker) remembered quite well a remark made by Mr. Liberty in his lecture in 1913, when he said Mr. Sugg's object always was to experiment, again experiment, and then experiment. Well, they had continued since Mr. Sugg's death to carry on this work. They had had very many difficulties to contend with; but they had always been able to put forward, to assist the various gas engineers, something with which to meet the competition of the electric light. The shops they had just visited were not perhaps what one would to-day call modern shops, because they were the result of the building-up of the business. If they were striking-out on an entirely new line, they would no doubt construct the shops very differently.

Mr. LOFTS, referring to the question of high *v.* low pressure lighting, said some of those present might have wondered how it was the firm did not go in for high-pressure lighting at the present time. Formerly they supplied a large number of high-pressure installations; and the reason why they had discontinued to do so, he would explain. In the first place, it was found in these days of heavy labour costs that the outlay on maintenance for high-pressure lighting was far greater than for low pressure. They were at present concentrating entirely on low-pressure inverted lighting. There were some upright burners still being made; for there were some people who would continue to go in for old-fashioned things, notwithstanding that they cost more for gas. But low-pressure inverted lighting was the thing for to-day. Under pre-war conditions of gas and mantles they could have obtained 15 candles per cubic foot for upright mantles; and they could get a duty of 25 candles horizontally, without reflectors, for an inverted burner. And they could have obtained, at an angle of 45°, with ordinary low pressure—viz., 2 in.—50 candle power per cubic foot of gas, used in the multiple burner system, combined with a superheater. Therefore if this could be secured under pre-war conditions, with a low-pressure inverted lamp, what need was there for high-pressure lighting for shops and factories? For lighting stretches of roadway, where large units were required, the greater depth of the high-pressure mantle was perhaps better than a large number of small ones. Three railway companies who had tried all means of getting improved lighting, had decided to have no more high pressure. The shops of the firm were now congested with orders; and they could have utilized twice the space and twice the staff they had, without going round begging for orders. Owing to the different qualities of gas in various parts of the country, it was impossible to send out lamps with fixed air-nipples and fixed gas-ways. An air-regulator with a fine adjustment was absolutely necessary under present conditions. Both air and gas must be under perfect control. When inverted lighting first came on to the market, the mantle most commonly used was the No. 4, burning (with pre-war gas) about 4 c.ft. of gas per hour. But afterwards it was found that, the smaller the inverted mantle, the greater was its illuminating duty, and the stronger was its life. In the "Littleton" lamp, the No. 2 mantle was found to meet the case excellently from a commercial point of view. The best evidence that this sized mantle, with the superheater, was much more economical than the larger sizes was the number of orders for conversion that were being received. One London company alone had already had about 2000; and no doubt they would require more. In railway shunting yards, these mantles were found to stand wonderfully well. With the exception of one company, the firm had contracts with all the railway companies in England; and they had also railway lighting in other parts of the United Kingdom. In Belgium to-day, the authorities were adopting these newer sized mantles, instead of the Graetzin type which were formerly employed. In the firm's own foundry, the No. 2 mantle was used for naked lights. No doubt, the ideal minimum pressure was somewhere in the neighbourhood of 25-10ths. But in very many instances this was unattainable; and nothing could accommodate itself so well to these conditions as the small mantles. They were working satisfactorily at 15-10ths, though, of course, the duty was not the same as at 25-10ths. In Belgium the pressure was often 12-10ths; and even then the burners were giving good results. If they were all of them alert during the coming days, they would have no reason to fear electricity.

Mr. WALLER said he hoped the visit had been enjoyed, and that it would not be long before the members came to see them again. The firm could claim to have been connected with the gas industry for a very long period; and some who represented it now had been associated with the business for thirty or forty years. During this time there had been great developments in illumination by gas. Was there going to be a still greater further development in this direction in the future, or was gas to be developed in other ways? This was a problem for the younger generation of gas managers, to whom he hoped the members would presently belong. He wished the Association all the success they would like it to have.

The PRESIDENT said Messrs. Sugg & Co., who were a real old English firm, had shown that they were keeping abreast of the times. The members were very much obliged to them for having thrown open their works. There was no doubt the gas industry should consider itself fortunate in having behind it such a firm, who had produced lamps based upon scientific principles, which had helped them to oppose electricity. Scientific principles entered into the construction of all Messrs. Sugg's appliances. The remarks of Mr. Lofts had been so interesting that they would have no hesitation in asking him to come along and address them at one of their business meetings in the near future. Personally, he did not think finality had been reached. He believed the heating value of gas was going to be applied to an even greater extent in lighting. So far from assuming that they were going to lose their lighting load, he was of opinion that—provided they used the right methods and the right appliances—they stood an excellent chance, not only of maintaining their present lighting, but of increasing it, in the face of the wonderful half-watt electric lamp. That afternoon they had enjoyed one of the best engineering visits the Association had ever had.

Mr. D. J. WINSLOW proposed a very hearty vote of thanks to the firm for their hospitality, and to the gentlemen who had received them and shown them round the works.

Mr. W. L. WESTBROOK seconded this, with the remark that the name of Sugg had all along been linked with gas progress.

Mr. W. J. LIBERTY supported the vote, as a very old personal friend of the late Mr. William Sugg.

Mr. MATTOCK, in acknowledgment, expressed the hope that they might see the Association there again at any rate within the next twelve months.

Monazite Beds in Ceylon.—Alluding to the beds of monazite sand which have been discovered in Ceylon, the "Board of Trade Journal" says that a special plant for the treatment of a bed of this sand near Bentota was erected during 1918. The plant has worked successfully; and by the end of the year some 20 tons of refined sand had been separated. This will be shipped to England when an opportunity occurs.

SCOTTISH JUNIOR GAS ASSOCIATION.

(EASTERN DISTRICT.)

Last Saturday afternoon members paid a visit to Perth, where an excellent programme had been arranged for them by the Engineer and Manager, Mr. D. Vass. A visit was paid to the workshops, to witness the spraying of gas-meters and to inspect the plant for re-tinning pans used in gas-cooking appliances; and then at the gasholder station they were made acquainted with the system adopted at Perth of spraying paraffin into the gas-mains so as to overcome the naphthalene trouble. Afterwards they were entertained at tea by the Corporation; and this was followed by an address by Mr. Vass.

PURIFICATION.

By DAVID VASS, of Perth.

When one looks back to the paper read by the late Mr. William Young, of Peebles, before the North British Association at their meeting in 1887, entitled "Purification in Closed Vessels," one is inclined to ask if there has been any outcome from the ideals therein portrayed, and what has been the effect of time and circumstances in relation to these ideals, and to other points incidentally referred to in the paper. The ideal aimed at was the removal of ammonia, carbonic acid, sulphuretted hydrogen, and "the more complex sulphur compounds of carbon, hydrogen, and nitrogen" from the gas by processes less laborious and freer from nuisance than that generally in use at the time, and in particular to get rid of the necessity of frequent emptying and filling of lime and oxide purifiers.

At that date dry lime purifiers were in general use throughout Scotland; oxide being employed in less than half-a-dozen works. The paper dealt with the principles involved in the removal of carbonic acid and sulphuretted hydrogen by means of the ammonia derived from the coal, and the removal of disulphide of carbon and sulpho-hydrocarbons by means of the hydrocarbons from the coal. He showed by means of an experiment how solutions of ammonium carbonate and ammonium sulphite, such as are formed in the hydraulic main, have the power of absorbing caustic ammonia from the crude gas; and this caustic ammonia in solution has the power of combining with a further quantity of the impurities in the gas, thus strengthening the solution of carbonates and sulphites and at the same time leaving the solution free to absorb a further quantity of caustic ammonia.

Now this is exactly what happens in working-up the ammonia liquor in a brush scrubber or any similar apparatus; but the first point which I wish to emphasize is the value of the hydraulic main liquor viewed in this light. In the hydraulic main liquor we have a very high proportion of caustic ammonia. In some works full advantage is not taken of this, and it is allowed to run direct to the well. If the hydraulic main liquor can be separated and freed from tar, and then conveyed either to the first portion of the scrubber or pumped into the top of the condensers, it will do useful work in absorbing CO_2 and H_2S.

Another deduction which I draw from Mr. Young's argument is that an 8° Tw. solution of ammonia should be just as stable as a 4° Tw. solution, assuming both solutions to be definite solutions of ammonia carbonate and ammonia sulphite. This matter is of some importance to all works sending their liquor a long distance by rail. Mr. Young indicated a general line of action for the carrying-out of his ideas; but so far as I am aware the subject was never brought to a practical bearing on the lines as then indicated. Matters of greater financial importance to gas undertakings demanded his attention shortly after this date; and "Purification in Closed Vessels" had to be shelved.

I do not propose to follow Mr. Young's paper further in his dealings with H_2S and CO_2, as they involved the use of mechanical arrangements; and the cost of such an arrangement might possibly exceed the saving and convenience to be derived therefrom, unless in cases where an entirely new purifying plant was under consideration, when the cost of Mr. Young's arrangement could be weighed against the purifier-box method. Indeed, I have been informed that the narrow margin of financial benefit may have accounted for the want of application of the method; and as in Mr. Young's days purification costs (by lime) were about 2d. per 1000 c.ft. of gas made, and to-day the cost of oxide and revivifying *in situ* is reckoned in decimals of the penny, we need not follow him further in his method of dealing with H_2S and CO_2, but will examine present-day methods.

In Scotland, to-day, I think I am safe in saying that oxide of iron is in use in all works making over 2,000,000 c.ft. per annum, and even in some of the smaller works. In 1904, however, very few works were using oxide; and for those of you who wish to follow-up the experiment made by myself at Airdrie, which led to what is now known as the backward rotation process, I would refer you to the paper read before the meeting of the Scottish Junior Gas Association (Western District) on Nov. 5, 1904, by Mr. James Bell, of Dumbarton, who was at the time my assistant at Airdrie.

Where the purifiers are large and only need changing once or twice a year, the ordinary forward process may be quite satisfactory; but where they require changing oftener than this, I would recommend the backward rotation process. By the use of oxide we do not entirely get rid of the more complex sulphur compounds; and although the quantity is small, it may be worth an effort to remove them. Quite a number of works have experienced difficulties in their mains and services, due to the formation of a brown dust or powder, usually in a dry state resembling oxide of iron. This difficulty of corrosion in gas-services was the subject of a paper read by Mr. M'Leod, of Greenock, before the Institution of Gas Engineers at Glasgow in June, 1911; and from an examination of the analysis of the material removed from the various services, I am inclined to ask can this trouble be due to sulphur compounds combined with ammonia or cyanide, acting on the iron pipes? If so, then all the more need of getting rid of the small quantities of these impurities. Mr. Young's proposals were to utilize the hydrocarbons from the coal for this purpose; and for this he proposed to take the naphtha recovered from the coal tar, extract the sulphur compounds from it, and wash the gas with this rectified naphtha, so as to absorb the sulphur compounds from the gas, and continue this process of extraction and washing much in the same way as we recovered benzol from the gas during the war.

One of the points incidentally referred to was the loss of ammonia carried away in the coke, and the possibility of recovering it by the action of steam in a closed chamber. By the system of steaming introduced within the past year or two, we are getting the result anticipated by Mr. Young in the shape of an increased volume of ammonia per ton of coal, where such steaming is used in either vertical or horizontal retorts; and by the use of verticals the producing of a steam-quenched coke at the bottom of the retort is bringing out his ideal of quenching the coke in such a manner as to minimize the production of breeze.

SPONTANEOUS IGNITION OF COAL.

A paper describing "A Method for Determining the Relative Temperatures of Spontaneous Combustion of Coal," by Captain F. S. SINNATT, M.B.E., and Mr. BURROWS MOORE was read by Captain Sinnatt at a meeting of the Manchester Section of the Society of Chemical Industry on Friday last.

The work that had so far been carried out, Captain Sinnatt explained, was but the beginning of a lengthy investigation into the causes of the spontaneous ignition of coal which the authors had undertaken. The apparatus used in the experiments was that described by Mr. Harold Moore before the Society of Chemical Industry. The ignition meter and the method devised by Mr. Moore had been adhered to as closely as possible. The apparatus and a series of curves were shown on the screen.

The method of determination consisted in dropping a small quantity of the coal under examination into a crucible maintained at a series of constant temperatures; a time record being kept at each particular temperature of the following phenomena: (1) The time at which glowing in the coal first occurred, and (2) the time at which spontaneous ignition or explosion occurred. The results obtained from a number of samples of different coals were plotted. The graph showing the time at which glowing occurred was comparatively regular; while with the spontaneous ignition there appeared to be temperature zones at which ignition of the compounds occurred with greater difficulty. The authors suggested that the temperature-time curve at which glowing occurred should be the means for characterizing coals. From the curves obtained from coals which were known to produce gob fires, two examples were cited which had been found to differ very considerably from the curves obtained in respect of ordinary types of bituminous coals. From the preliminary experiments carried through, it was shown that the fineness of the coal had a decided influence upon the temperature at which glowing occurred. In the case of mixtures of fine and coarse coal, the temperature of the occurrence of glow had a distinct tendency to approach that of the finest material. The products of distillation played a most important part in the production of glow—in other words, if the coal were carbonized at a low temperature the products that were given off would probably play the main part in making the coal heat-up. The results of the work led to the conclusion that the figures obtained seemed to indicate that they might have a distinct value in showing the risks of firing in coals left behind in the pits or when in store. Up to the present there had been no clear indication whether coal would fire or not—in other words, whether a certain coal was a good storing coal.

Trade Organizations and Combinations.—There has been received from Messrs. Harrison and Sons, of St. Martin's Lane, a copy of "A Study of Trade Organizations and Combinations in the United Kingdom," prepared for the Committee on Trusts by Mr. John Hilton, of the Garton Foundation. It is based upon evidence given, and documents laid before, the Committee, and has been reprinted from the Committee's official report by permission of H.M. Stationery Office. The book is divided into eight sections. Two of these are devoted to the achievements and the dangers of combination, and another to safeguards; for, as the author says, the facts and tendencies reviewed by him "lead irresistibly to the conclusion that, while the growth of combinations is in many ways desirable, some kind of safeguard or check is required to prevent the monopolistic power which combination gives being used detrimentally to the public interests." The price of the book is 1s. net.

CORRESPONDENCE.

[We are not responsible for opinions expressed by Correspondents.]

"Are our Gas Appliance Makers behind the Times?"

SIR,—In reference to the letter from Mr. William Armitage Drake, of Halifax, in your issue for Nov. 18, we are the makers of Clark's "Fairy" Gas Iron, the performance of which Mr. Drake criticizes.

We think, however, you will agree that, before your correspondent made such a sweeping condemnation of an extremely useful domestic gas appliance, he should have produced some evidence as to the nature of his gas supply—*i.e.*, pressure, &c.—together with particulars of the circumstances of its use, and the condition in which he found the iron before he enlarged the air-intake area.

After six years' experience of the working of this iron, under many diverse conditions, we contend that a Méker flame could be produced with a reasonable gas supply without any alteration to the burner air-inlet.

The strong feature of the appliance is the highly aerated flame which can be attained with the iron as constructed. We feel confident the fault was not with the iron.

The iron has been on the market now for many years, and is in use in thousands of households in this country with unqualified success; and we assert that there must have been some peculiarity in the conditions, not stated by Mr. Drake, to account for his experience.

Every iron before it leaves our works is thoroughly tested and adjusted to work satisfactorily, and to give a good Méker flame, sweeping well along the sole of the iron. The gas-and-air adjuster with which the iron is fitted is a properly constructed and efficient method of regulating both gas and air.

Warrington, Dec. 1, 1919. CLARK'S SYPHON STOVE CO., LTD.

Transmission of Gas over Long Distances.

SIR,—With reference to the report in the "JOURNAL" dated Nov. 18 [p. 371] of the Doncaster meeting of the Institution of Mining Engineers, the chief interest apparently centred in the description of the supply of coke-oven gas from Tinsley Park to Sheffield, thus opening-up the question of the delivery of gas at high pressures over considerable distances.

Both Mr. Laverick and Mr. Watson mentioned that in America natural gas was conveyed very long distances. The name "America" is generally taken as referring to the United States; and one gathers that it was in this sense that the word was used. The writer would, however, like to point out that the United States has no monopoly of high-pressure natural gas supplies, as Canada has also some hundreds of miles of high-pressure mains.

One important district enjoying a supply of this gas borders the northern shore of Lake Erie; the gas from the wells being at a pressure of about 400 lbs. per square inch. Further west there is a large gas-field contained in the triangle formed by the towns Medicine Hat, Lethbridge, and Calgary. The writer, in 1911, had the privilege of examining and reporting on this field, since when very extensive developments have taken place. A number of wells have been drilled, and the gas sand pierced at a depth of 2000 ft. The closed gas pressure is 850 lbs. per sq. in., and the wells will each deliver a bulk of gas up to 10 million c.ft. per day. This high pressure is broken-down to an intermediate one of 450 lbs., at which the gas is conveyed through a 15-in. steel main a distance of 170 miles—branches being taken off to supply about twenty intermediate townships and districts. For town distribution, the pressure is again cut-down to 25 lbs. per sq. in., while individual governors are fixed to the services, reducing the pressure to 4 oz. At present the gas sold is over 20 million c.ft. per day.

In the United States there are cases where the well pressures have fallen too low to drive the gas in sufficient quantities to the points of consumption. To deal with this phase, there have been constructed booster stations equipped with enormous compressors, which draw the gas from the low-pressure mains, and force it forward at a pressure of about 150 lbs.

The work of installing a high-pressure delivery system is therefore no novelty; and there is no known unsurmountable difficulty even in supplying London with gas manufactured in the Midlands, provided continuity of supply and the necessary capital can be guaranteed.

39, Victoria Street, Westminster, Dec. 2, 1919. H. KING HILLER,

Limitation of Coal Profits.

SIR,—If only for the sake of fairness—upon the sense of which the British nation is usually credited with being especially sensitive—the strongest of protests ought to be made against the intention of the Government to limit the profits in the coal industry to 1s. 2d. per ton. The injustice lies in selecting the coal trade as the first victim to the Government assault upon private enterprise. If the Limitation of Profits Bill is passed, a most dangerous precedent will be established. No British industry will be secure against similar invasion.

As things at present stand, huge demands are already made on the profits of all industries, in the shape of income-tax, super-tax, excess profits tax, and other revenue charges, to say nothing of local rates; so that, if this latest financial raid becomes an actuality, the prospects for British commercial enterprise, from the investment point of view, are very blank indeed.

The coal industry is one of those "key" trade activities the maintenance of which the Government has time after time professed its intention to safeguard. It may, indeed, be called the "key of key" industries; for on its welfare depends that of nearly all British trades. It is therefore all the more surprising that the Government should commit themselves to so mischievous a move against so essential an industry. Moreover, the coal industry is carried on largely through the instrumentality of limited companies, whose shareholders can be numbered in thousands throughout the country. These investors will all suffer if the Government move is carried out. The profits of the colliery companies will drop, and dividends will diminish and in many cases vanish entirely. Why should the poor investor be punished in this way? Without the investor, where would British trade and industry be? He is the upholder of British enterprise; and yet the Government is short-sighted enough to deal him this unfair blow. Every British trade is threatened by this unfair treatment of the coal trade, which, if legalized by the Bill, will be extended to other industries and be a wide-spread blight upon private enterprise and investment.

Montholme Road, Wandsworth Common, S.W. 11. W. H. HARVEY.
Dec. 5, 1919.

Training, Appointments, Salary—All Disappointments.

SIR,—Much has been said and written on the training of the future gas engineer; but up to the present, few and little facts have come to hand.

Couple this with the semi-starvation rates of remuneration offered by the "High Brows" of the profession, and it appears to the majority of the Juniors that it is very nearly time they forsook the gas industry for a more remunerative zone of engineering activity, where their varied knowledge and experience, gained in the extensive routine of gas practice, would be paid for, appreciated, and used to advantage.

Further, study the advertisement columns of the Technical Press—there we find, at times, all-round men are wanted. Result? Many applications, each with the hope of his case being considered on its merits. But, however, the successful candidate has, more often than not, been able to bring to bear strong local influence on his application; and, whether or not he is suited for the position, he is unanimously appointed.

Therefore, in the light of undeniable facts, it certainly appears immaterial what course of training is devised or adopted; for, as in the past, so will the future be.

Dec 1, 1919. JUNIOR.

Redcar Council and the Gas-Works Purchase.

The Redcar Urban District Council met last Thursday to consider resolutions authorizing them to make application in the next session of Parliament for an Act to enable them to purchase the local gas undertaking, and also to empower them to manufacture and supply gas in the district. Major J. S. Crone, J.P. (Chairman), who moved the resolution, said the Council should make every effort to see that the people of the town had full value for every penny they spent on gas. It was their duty also to see that the benefit of increased business in gas due to the rapid growth of the town should be secured to the local public. There was every prospect of big industrial developments; and he was confident that in a year or two there would be available a cheaper source of gas supply from coke-ovens. Mr. T. Phillipson, in opposition, argued that the ratepayers had never been consulted in the matter. He had a petition asking for a special public meeting, and a ballot of the town. The Gas Company were selling to the ratepayers because they could get more from them than from anybody else. They should go in for electric lighting, and be up-to-date. Mr. Metcalf declared that Mr. Phillipson was objecting to one of the best investments the Council had ever made; while Mr. Davies added that the ratepayers were determined to have the gas-works. Electricity was too expensive, said Mr. Davies, and he would not be a party to introducing it for the rich to benefit and the poor to pay for it. Mr. Phillipson was the only member who did not vote in favour of the proposals. The seal of the Council was then affixed to an agreement with the Gas Company for the purchase of the undertaking.

Success of Benzol as a Motor Fuel.

Writing on the success of the 10,000 miles test of benzol as a motor fuel, the motoring correspondent of "The Times" says: That the use of a suitable type of benzol in place of petrol is entirely practical for motor vehicles has been successfully demonstrated by the recently concluded trial of a 16-H.P. "Sunbeam" car over 10,000 miles of give-and-take roads. The trial was undertaken by the Automobile Association and the Motor Union, to ascertain whether the many criticisms of benzol were based on fact. The dismantled working parts of the car which underwent the trial were inspected by a representative of "The Times," and showed no perceptible signs of damage due to the use of the fuel. A small amount of carbon appeared to have formed on the tops of the pistons; but there was no deposit worth mentioning on any of the valves. The condition of the silencer was normal. The trial was begun on Aug. 28, and ended on Nov. 5, rather over 10,000 miles being accomplished under ordinary touring conditions. The benzol was supplied by the Gas Light and Coke Company, the Staveley Coal and Iron Company, William Butler and Co., the Staffordshire Chemical Company, and Bolckow, Vaughan, and Co. During the test 406 gallons and 7 pints were consumed; the average mileage being 24·57 per gallon. The highest average attained was 27·74 miles per gallon. This figure is very remarkable for a car of the size and power of the "Sunbeam," whose engine dimensions are 80 millimetres by 149, the cubic content being 3 litres. In view of the high price of petrol to-day, the results of the trial should prove of considerable interest to motor users of every class; the price of benzol being 2s. 9d. per gallon, in 2-gallon tins, as against 3s. 0½d. for ordinary petrol.

In Victoria (Australia) there is a strike of gas-works employees, to enforce a demand for an increase of wages.

The Bury Town Council have resolved to make application for sanction to borrow £3350 for the purposes of the Gas Department, in addition to the £43,000 in respect of which application has already been made.

REGISTER OF PATENTS.

Water-Gas Producers.—No. 112,268.

COMPAGNIE POUR LA FABRICATION DES COMPTEURS ET MATÉRIEL D'USINES À GAZ, of Paris.

No. 18,757; Dec. 17, 1917. Convention date, Dec. 19, 1916.

This invention has particular reference to a false grate, by the use of which the cleaning of water-gas producer grates is facilitated.

The arrangement proposed for facilitating the freeing from clinker of the grates of water-gas producers is characterized by them being built with a rectangular internal cross-section, and by the arrangement in the centre of the furnace of a bearer supporting the grate-bars and projecting somewhat above the latter, so as to form a support for two series of bars forming a false grate. This is inserted through suitably placed furnace doors, the first series resting on the bearer and the second series crossing and resting upon the bars constituting the first series—the arrangement being such that the bars constituting the false grate are sufficiently close together to avoid the coke falling through during the cleaning operation.

Fig. 1.

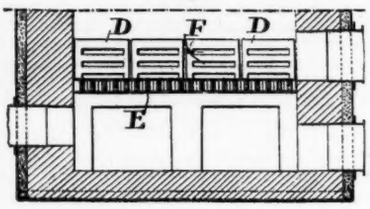


Fig. 3.

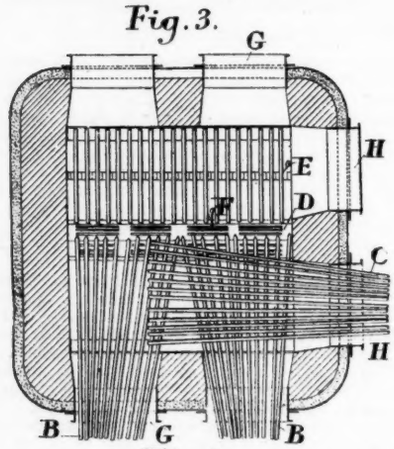
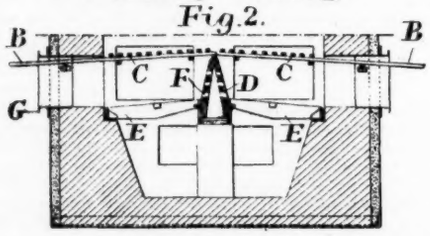


Fig. 2.



A French Arrangement of Water-Gas Producer False Grates.

Fig. 1 is a sectional elevation, fig. 2 a sectional side elevation, and fig. 3 a horizontal cross-section of an arrangement which makes it possible suitably to arrange the false bars B C and to keep the coke in suspension in a "thoroughly reliable manner." It consists in giving to the producer a square or rectangular cross-section; and in providing in the centre of the lower part a bar or bearer D supporting the grate bars E and projecting above the latter to a height of 25 to 30 cm. This bar is constituted by a kind of hollow bearer provided with large openings F for the passage of air and steam, and constituting what may be regarded as part of an almost vertical grate, "to which the clinker can adhere only with difficulty." Furnace doors G H, arranged at suitable places, make it possible to arrange the false bars in two series—one B coming to rest on the bearer D, and the other C coming to rest on the first series B in a direction normal to them.

As shown, the whole cross-section of the producer is thus "provided with false bars, well supported, and arranged sufficiently close together to avoid any falling down of the coke, so that the cleaning can be effected without difficulty."

Incandescent Gas-Burner.—No. 134,377.

CAMPBELL, T., of Sunderland.

No. 19,089; Nov. 21, 1918.

This burner is intended to be used with an inverted mantle resting on an upright type of burner, in place of a long mantle suspended by a crutch. The "improvement" consists in the cap of the burner being made with a shoulder about ¼ in. below the gas outlet, on which the frame of the mantle rests. From the centre of the gas outlet a thin rod carrying a small circular disc or spreader projects—the gas outlet being otherwise quite open. The gas outlet and the spreader being inside the mantle, "the spreader arrests the upward rush of flame and diffuses it over the inner surface of the mantle."

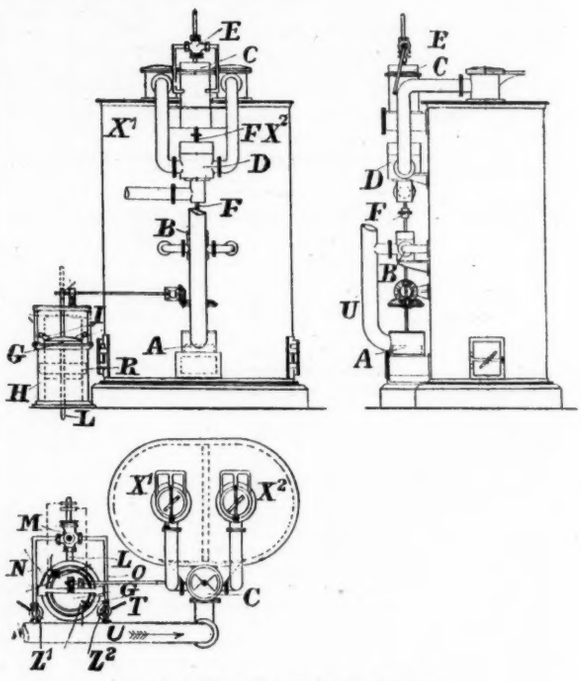
The economical advantages of this burner over those generally in use are said to be: 1. Greater economy in the use of mantles; the inverted kind being stronger and less susceptible to draughts and vibration than those generally used on upright burners. 2. Greater steadiness in the light, owing to the mantle resting on a steady base, instead of being suspended on a crutch. 3. Economy effected by dispensing with the use of a glass chimney and the crutch.

Operating Water-Gas Plants.—No. 134,573.

SMITH, H. E., of Victoria Street, Westminster.

No. 12,694; Aug. 3, 1918.

The invention relates to an improved arrangement of the valves and gearing for operating water-gas plants of the twin-generator type, as described in patent No. 24,893 of 1908.



Smith's Twin Water-Gas Generators.

The present invention comprises the arrangement of dry-faced centre-valves A for the primary inlet, B secondary air inlet, C stack-valves, D gas, and E steam valves, assembled in such a manner that the whole operation can be carried out at one and the same time by simply operating one central shaft F through an angle of 90°. As shown, an oval shell is provided in which is formed a double generator X^1 and X^2 supplied with an air-blast pipe U connected with the body of the valves A and B. When these valves are open, ports in the primary-air disc-valve coincide with ports in the top of the primary-air duct to the generators, and the ports in the cap of the secondary air valve are open to the secondary air pipes to the generators; so that both generators are blown in parallel, and the waste gases are discharged through the body of the stack, the ports in the seat casting, and the ports in the disc-valve—these ports being now registered with each other. The gas-valves and the steam-valve E are shut during this period.

When the necessary heats are obtained, the valves A, B, C are closed—the same action opening the steam-valve E into the generator X^1 and turning the cap of the gas-valve so as to connect either of the gas outlet pipes with the central passage. This central passage communicates with the gas-main so as to give an outlet to the gas formed by the passage of steam through the generators.

At the end of the run all the valves are again turned, to give an air blow to both generators and shut off the gas and steam valves. When the blow is complete, a further turn shuts off the air-valves and turns on the steam and gas valves, in a reverse direction to the previous run—the steam thereupon passing into generator X^2 and the gas away from generator X^1.

With such an arrangement of valves very little power is required, the patentee points out, as no valve has to be lifted. The operation can be carried out by unskilled labour, or an arrangement can be provided to give the necessary power at required intervals from an automatic controller worked off the blower supplying the pressure to the plant. This portion of the apparatus would consist of a cylindrical bell G immersed in a liquid seal contained in a tank H. The bell would be provided with rollers working in guides so that it would be free to rise and fall. The pipe L, connected through the outlet main U of the blower, would pass through the water-seal and finish underneath the crown of the bell. In this pipe would be inserted a valve M for two separate branches NO, connected with the air-pressure main

U, and each will be provided with a valve Z^1 Z^2 "giving a very fine adjustment"—set by hand to the exact apertures required. The valve M will also have two other branches open to the atmosphere.

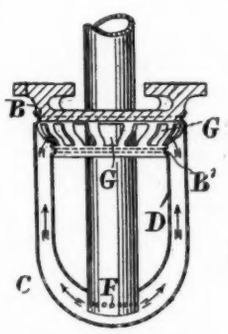
To put the plant in operation, air will be admitted (through one of the valves Z^1 or Z^2) to the underside of the bell, and the valve in use will be so adjusted that the pressure required will be obtained in a predetermined period—say, one minute for the blow. The bell will be held down by a few trigger levers T arranged around its outer edge. As the water inside the bell is depressed, it rises in the annular space and lifts the float R, which, in reaching wedge plunger T, will raise it and draw the bolt which releases the bell and allows the whole pressure under it to quickly raise the bell and operate the valves A, B, C, D, and E. On reaching the required height, a bob-weight lever is pushed over its top centre by a projecting pin on the rack, and, engaging a pin on its boss with the end of a suitable slot on a disc, turns it by its own weight so as to cause a pawl to advance the ratchet wheel and turn the valve M through 90°, allowing the pipe L to open to the atmosphere, so that the contents of the bell G are expelled and the bell sinks and is again secured by the levers T. When the bell reaches this point, the valve M is again operated and turned a further 90° by the bob-weight lever being pushed again over its top centre, and caused to advance the ratchet wheel and valve M, bringing the pipe L into communication with the opposite adjusting valve Z^2 or Z^1, which is set to give the required pressure for release in (say) five minutes, so as to carry out the operation required for the run.

Incandescent Gas-Burners.—No. 134,721.

THOMAS, J. G., of The Godrer Craig, Swansea Valley.

No. 3563; Feb. 13, 1919.

This invention relates to a combination of a body corresponding more or less to the shape of the mantle and arranged within it in such a manner that an annular space of small radial width is left between it and the mantle and a mixing-tube which extends downwards so as to admit the air and gas to the space at the top or closed end of the mantle.



Thomas's Double Mantle Gas-Burners.

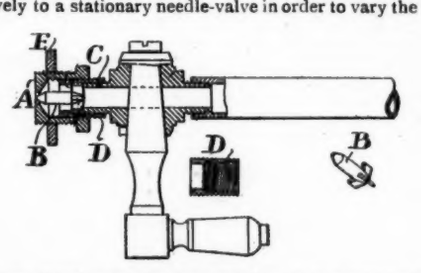
The burner shown comprises the usual support provided with two circumferential grooves B B^1 of different diameters, within each of which is respectively secured the mantles C D. The inner mantle is provided with an aperture at its lower end to accommodate a mixing-tube E, the extremity of which projects to within the space formed by the two mantles at the top or closed end. The tube (secured to the gas supply pipe) forms a continuation thereof for the purposes of discharging the gaseous mixture to within the space formed by the mantles. If desired, the lower end of this tube may be closed and a series of small apertures F provided for the outlet of the gas. Outlets G connect the space between the mantles with the outer atmosphere, and so allow for the free egress of the burnt gas. One or both of the mantles may be capable of becoming incandescent under the action of the heat.

Regulators for Bunsen Gas-Burners.—No. 134,741.

FLETCHER, RUSSELL, & CO., LTD., RUSSELL, W., and FAIRHURST, T., of Warrington.

No. 6490; March 15, 1919.

This invention relates to gas regulators for bunsen burners, of the kind in which a cap or nipple provided with a central orifice is adjustable relatively to a stationary needle-valve in order to vary the effective



Russell and Fairhurst's (Fletcher, Russell, & Co.) Bunsen Burner Regulators.

area of the outlet and thereby regulate the supply of gas. The needle valve is clamped in position between a shouldered member and a part of the gas-fitting to which it is attached.

A plan is given, partly in section, of a gas-cock provided with one form of the regulator; also a longitudinal section of the clamping member, and a perspective view of the needle-valve.

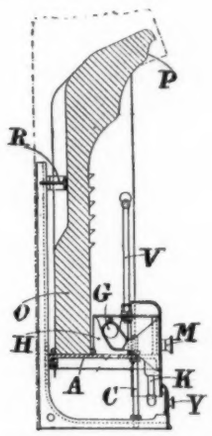
The rear or inner end of the needle valve B is formed with wings whereby it is clamped concentrically with the bore of the casing spigot by means of a sleeve D screwing on the spigot and formed with an internal shoulder between which and the end of the spigot C the wings are clamped. The nipple A screws on the sleeve and is adjusted to control the effective area of its orifice. The rear or inner end of the valve is tapered between the wings as shown. Owing to the short length of the needle-valve, no difficulty is experienced in mounting it and maintaining it true relatively to the gas passage and the nipple orifice, and it does not obstruct the flow of the gas to the orifice. E is the usual disc screwing on the nipple, to regulate the quantity of air drawn into the mixing tube by the gas issuing from the nipple orifice.

Incandescent Gas-Fires.—No. 134,788.

GEORGE, T. A., of Newcastle-upon-Tyne, and MURRAY, F., of Stratford, Essex.

No. 16,038; June 25, 1919.

This gas-fire is provided with a vertically adjustable base-plate supporting the burners and the heat-radiating back plate, fitted into a casing provided with baffles "to trap the heat of the products of combustion as they pass to the flue."



George and Murray's Incandescent Gas-Fire.

In the embodiment of the invention illustrated, A is the base-plate supported at the front on screwed vertical rods C carried by the horizontal members of two L-shaped supports, and at the rear by studs passed through one pair of a series of holes in the vertical members of the supports. The height of the base-plate can thus be adjusted. The burners G rest in cheeks H formed in one with a central gas-and-air mixing chamber supplied with gas by a pipe K and with air and gas through a regulating device M in the front plate. The base-plate also supports the heat radiating back-plate formed with a series of projections so as to distribute the hot gases rising from the burners, and with a forwardly-projecting portion P at the top having a bulge (as shown) to throw the heat outwards and downwards. The back-plate, of fire-brick material, is secured in position by a dovetail-shaped cross-bar R, which engages a recess in the back of the plate and provided with side lugs so that the back-plate O is supported in such a fashion that it can be readily fixed into position, and so that its support is not affected by the vertical adjustment of the base-plate. The artificial fuel [not shown] is supported by a perforated false bottom above the burners, and is prevented from falling forward by side rods V connected by cross-bars. An auxiliary air regulator Y is provided in the bottom front-plate and secured to the front ends of the supports, whereby additional air for combustion can be allowed to pass to the burners through apertures in the base-plate A.

Continental Union Gas Company, Ltd.

The report of the Directors to be presented at the ordinary genera meeting on Tuesday next says: In presenting their report last year, the Directors anticipated some alteration in the shipping situation, but pointed out that any alleviation must necessarily be gradual. This view has been justified by events; and the measure of relief during the year under review [to June 30] was but slight. The period of re-adjustment and transition following the war has been one of extraordinary difficulty and complexity, and promises to be of long duration. The burdensome cost of coal in foreign ports, and the demands of labour, tend to render unremunerative the working of contracts concluded on the basis of pre-war prices. In these circumstances, the Company's large Continental interests have remained necessarily unproductive; and the profit and loss account now submitted contains only the revenue received during the year from the Company's minor investments. After deducting management expenses, pension charges, and income-tax, the credit balance to be carried forward to next year is £9672—being an increase of £3779 on last year. While it is regretted that the time has not yet arrived for the resumption of dividends, it is a matter of congratulation that, in the face of shipping and other difficulties—including the submarine menace and the almost prohibitive cost of fuel—it was found possible to maintain throughout the whole period of the war the important services in France and Italy in which the Company is interested; and it is hoped that they may yet be restored to a measure of prosperity in which this Company will share.

PARLIAMENTARY INTELLIGENCE.

HOUSE OF LORDS.

Progress of Bill.

The Swinton and Mexborough Gas Board Bill was read the third time, with the amendments, passed, and returned to the Commons.

HOUSE OF COMMONS.

Gas Charges and the Household Coal Price Reduction.

Mr. ALFRED SHORT asked the President of the Board of Trade whether the reduction in the price of domestic coal would carry with it a reduction in the price of domestic gas; whether he was aware that when the price of coal was increased by 6s. per ton consumers were charged an extra price for gas for a period of several weeks prior to the date on which the increased price of coal was imposed; and whether arrangements would be made whereby consumers of gas would derive the benefit of the reduced price of coal at the next meter-readings, in order to counterbalance the burden imposed prior to July 21.

Sir A. GEDDES said he hoped that the reduction in the price of domestic coal would result in a reduction in the price of gas supplied by all gas undertakings for domestic use; but there were, of course, other factors, such as the cost of labour and materials, which affected the price of gas. A number of gas undertakings had recently been contemplating a further increase in price owing to the increased costs of manufacture; and in some of these cases it might not be possible to reduce the present price by an amount corresponding to the reduction in the cost of coal. So far as he was aware, the increase in the price of gas consequent upon the addition of 6s. to the price of coal was not generally made until the beginning of the following quarter, and he could not hold out any hope of a general reduction in price before the next quarterly meter-readings.

Mr. HARTSHORN asked if the coal that was to be used for the production of gas was included in the 36,500,000 tons of coal to be affected by the 10s. reduction.

Sir A. GEDDES said he was not quite sure about the figure of 36,500,000 tons, which was not in his mind at the moment; but the coal which was used for making gas and electricity to be consumed in domestic household uses was included in the coal to be affected by the 10s. reduction.

Mr. J. JONES asked if Sir A. Geddes took into consideration the profits arising from the bye-products in the manufacture of gas in connection with the fixing of prices.

Sir A. GEDDES said that was always taken into consideration in connection with the price of gas.

Price Increase by the South Suburban Gas Company.

Mr. ROWLANDS asked the President of the Board of Trade whether the Board had authorized the increase of the price of gas supplied by the South Suburban Gas Company by 1s. 2d. per 1000 c.ft.; whether he was aware that this would raise the price to slot consumers in the Erith district from 5s. 11d. to 7s. 1d. per 1000 c.ft.; and would he inquire whether there was any justification for this large increase to slot consumers.

Sir A. GEDDES said the answer to the first and second parts of the question was in the affirmative. Regarding the last part, the Board gave careful consideration to all the circumstances at the time the increased price was authorized, and came to the conclusion that the increase was justified. In view of the reduction in the price of coal recently announced, steps would be taken to revise or revoke the Order under which the increase was granted.

Mr. ROWLANDS: Will there be an immediate reduction of price?

Sir A. GEDDES said he could not say that there would be an immediate reduction. This depended upon the increase in the price of gas which followed the last increase in the price of coal. Now that there was a reduction in the price of coal, the revision or revocation of the Order would be considered without any delay that could possibly be avoided.

Gas-Fires in Council Houses at Abertillery.—At a meeting of the Abertillery Gas and Electricity Committee, the question of fixing gas-fires in the new houses to be erected by the Council was discussed. It was resolved that the Housing Committee be recommended to make provision for fixing at least two gas-fires in each house, in such rooms as were thought to be most suitable—the cost to be charged to the capital expenditure. It was further resolved that provision be made for fixing a gas wash-boiler, such cost also to be charged to capital. The Committee recommended that the fixing of gas-lights and the cost of the installation of the services be dealt with similarly. The report has been adopted by the Urban District Council.

High Gas Prices in Edinburgh.—At a meeting of the Edinburgh and Leith Gas Commissioners on the 24th ult., Bailie F. J. Robertson referred to the correspondence which had recently appeared in the Press with respect to the high prices charged for gas, and, as it had been suggested that they were charging too much, he thought a statement should be issued by the Treasurer (Mr. A. Canning Williams) showing how the present prices were arrived at, and comparing them with those of other towns that had been mentioned. The Chairman of the meeting (Provost Lindsay, of Leith) said that the criticisms seemed to be based on figures which showed an entire ignorance of the subject. Though the cost of gas had risen, the returns from residuals had also increased. Last year Edinburgh had a return of 59 p.ct., as against Glasgow's 53 p.ct.; while this year the Edinburgh figure stood at 62·5 p.ct., and Glasgow's at 56 p.ct.—a fact which proved that Edinburgh still occupied the premier place in Scotland. Critics did not take into account the fact that the undertaking was labouring under a heavy charge for capital redemption. It was agreed that the statement asked for should be prepared.

MISCELLANEOUS NEWS.

COAL PRICES ORDERS.

Supplies for Gas and Electricity Works.

Two Board of Trade Orders under the Defence of the Realm Regulations, with respect to coal prices, were published as a supplement to last Tuesday's "London Gazette." The first bears upon household and domestic supplies. It is the second one, dealing with coal for gas and electricity works, which is of particular concern to "JOURNAL" readers; and this is reproduced below.

(1) The owner of every colliery shall supply coal of such description and in such quantity and to such persons as the Controller in his discretion may direct.

(2) Notwithstanding anything contained in the Coal (Pit's Mouth) Prices Order, 1919, where a person certifies as hereinafter provided that any coal delivered to him on cash terms from a colliery is required by him for re-sale or use for domestic or household purposes exclusively, the price at which such coal may be sold for cash at the pit's mouth shall be 10s. per ton less than the standard price fixed by the said Order, and no person shall sell, or offer for sale, or buy or offer to buy, coal for cash at pit's mouth for such purposes at any other price.

(3) No person shall sell coal for cash at the pit's mouth at the price fixed by this Order for domestic or household purposes unless the buyer certifies, in writing, in the form contained in the schedule hereto, that the coal so being bought by him is required by him for re-sale or use in either case for domestic or household purposes exclusively,

(4) Notwithstanding anything contained in the Coal (Pit's Mouth) Prices Order, 1919, where coal is delivered to a factor, merchant, or dealer otherwise than on cash terms, the purchaser may, upon the expiration of the term of credit, give to the colliery owner from whom he has purchased the coal a certificate, in the form contained in the schedule hereto, that the whole or some part (to be specified in the certificate) of such coal has been, or will be, resold or used by him for domestic or household purposes exclusively; and he shall then be entitled to deduct from the standard price a sum of 10s. per ton in respect of so much of the said coal as is included in the said certificate. Every colliery owner to whom such certificate is given shall allow such deduction accordingly.

(5) Where coal is delivered to a gas or electricity undertaking, the owners, or secretary, or manager, may, when paying therefor, give a certificate either to the colliery owner or to the factor, dealer, or merchant from whom they bought, that a proportion of the said coal has been, or will be, used by them for making gas or electricity for domestic or household purposes, and shall in that case be entitled to deduct 10s. per ton from the price in respect of such proportion. The proportion in respect of which such certificate may be given shall not exceed the proportion which the gas or electricity supplied by them for such purposes bears to their total output. Provided that the Controller may vary or prescribe the amount of coal in respect of which deduction may be made as he in his absolute discretion thinks fit.

(6) No person shall give a false certificate for the purpose of obtaining coal under the provisions of this Order.

(7) Every colliery owner and every factor, dealer, or merchant, and the owners of every gas or electricity undertaking shall, if and when required by the Controller so to do, disclose to him any book kept by them containing entries in regard to coal bought or sold by them, and shall supply copies of any entries that the Controller may require, verified in such manner as he may direct.

(8) All contracts for the sale of coal at the pit's mouth in force at the date when this Order comes into effect are hereby modified, so that the price of any coal or of any instalment despatched from a colliery on or after such date shall not exceed the price hereby authorized, and the price to be paid by any person to whom the coal is delivered in pursuance of any subsidiary contract shall be reduced by an equivalent amount, and, subject as aforesaid, all such contracts and subsidiary contracts shall remain in force.

(9) Nothing in this Order shall affect the Coal (Pit's Mouth) Prices Order, 1919, as to any coal bought or sold for any purpose other than domestic or household purposes.

(10) Coal shall be deemed to be bought or sold for domestic or household purposes only when it is bought or sold for the purpose of supplying (either by re-sale or directly) consumers under the provisions of the Household Fuel and Lighting Order, 1919, or any modification thereof. Gas or electricity supplied for domestic or household purposes means gas or electricity supplied to any premises coming within, and for the purposes mentioned in, the said Order.

(11) This Order shall apply to Ireland only in respect of coal supplied from collieries in Great Britain; and in deciding and certifying whether any such coal is bought or sold for domestic or household purposes, the provisions of the Household Fuel and Lighting Order, 1919, shall be deemed to apply to Ireland.

(12) In this Order "Controller" means the person holding the Office of Controller of Coal Mines for the time being.

(13) If any person infringes any of the provisions of this Order, or if any colliery proprietor, agent, or manager disregards any of the directions hereby given, he is guilty of a summary offence against the Defence of the Realm Regulations, and is liable, on summary conviction, to be sentenced to imprisonment, with or without hard labour, for a term not exceeding six months, or to a fine not exceeding £100, or to both such imprisonment and fine.

(14) This Order and direction shall come into force on the 1st day of December, 1919, and may be cited as the Coal (Pit's Mouth) Prices Order and Direction, 1919.

Dated this 28th day of November, 1919.

COALOWNERS' THREAT.

The following resolution has been passed by the South Yorkshire Coal Trade Association: "The Association, comprising practically the

whole of the collieries in South Yorkshire, view with consternation and alarm the announcement by the Board of Trade of a reduction of 10s. per ton in the price of household coal and for coal used in producing gas and electric energy for light and power supplied for domestic and household use. This will inevitably result in serious and disastrous loss to the house and gas coal collieries in this district. Such alterations at short intervals, and the fact that they are made without previous consultation with those engaged in the industry, are not only grossly unjust to the coalowners, but most seriously prejudicial to the various consumers' industries throughout the country. Further, if the Government continues to single-out the coal industry for political objects by policies of unwarranted confiscation and disorganization, the owners may be forced by circumstances to close the pits and refuse to work them until all questions are removed from the political atmosphere, as they feel that nothing but unrest and irreparable loss will ensue while bureaucracy obtains."

COALOWNERS' PROFIT RESTRICTION BILL.

The text of the Government Bill to give effect to the recommendation of the Coal Commission, that coalowners' profits should be restricted to 1s. 2d. per ton, is accompanied by a memorandum in which the main provisions are summarized.

1.—For the year ending on March 31 next the owners of undertakings in Great Britain covered by the Bill will be entitled, in the aggregate, to retain in respect of coal-raising operations (exclusive of ancillary operations such as coke-ovens) an amount equal to 1s. 2d. for every ton of the aggregate tonnage of coal raised and weighed at the pit-head.

2.—Such amount will be distributed among the undertakings in accordance with the proportion which the pre-war standard of profits (including the percentage standard) of each undertaking bears to the aggregate of the pre-war standards of all the undertakings.

3.—The pre-war standard of profits and the profits for the financial year will be determined in accordance with the excess profits duty provisions of the Finance Act, 1915, and subsequent enactments, with the adjustments for capital variations prescribed by those provisions, subject to the qualification that, in the determination of the pre-war standard and profits of any undertaking for the year ending March 31, 1920, account shall be taken only of the profits arising from coal-raising, and that allowance is made for the annual wastage of capital expenditure upon developments, shafts, and shaft equipment.

4.—Where the owner of any undertaking proves that, by reason of such limitation of profits, the income-tax assessment which has been made for the year ending April 5, 1920, would work injustice, the proper reduction of the assessment will be made.

5.—The Controller may make advances for the purpose of enabling the output of a coal mine to be maintained, or for any other purpose, on account of any sums which are, or may become, payable to the colliery owner by the Controller.

6.—Where advances have been made to undertakings in excess of (*a*) the amount of extra wages which were paid for the period from Jan. 9 to March 31 last, and (*b*) any payments which may become due to the owner under the Bill, the excess must be repaid.

7.—The agreement confirmed by the Coal Mines Control Agreement (Confirmation) Act, 1918, is deemed to have ceased to have had effect as from April 1 last, and that Act is repealed as from the same date.

Sundry provisions on the lines of the Coal Mines Control Agreement (Confirmation) Act, 1918, dealing with payment of dividends, closing of mines, and the furnishing of accounts and information, have been embodied in the Bill.

EAST PEMBROKESHIRE GAS LIGHT AND COKE COMPANY'S LIQUIDATION.

Report of the Official Receiver.

The Official Receiver in the Companies Winding-Up Division of the High Court of Justice has issued his report under the liquidation of the East Pembrokeshire Gas Light and Coke Company, Ltd., of No. 14, Victoria Street, Westminster, from which it appears that the statement of affairs as regards creditors shows gross liabilities amounting to £1234, of which £670 is due to unsecured creditors. The net assets (after deducting the loans on debenture bonds) amount to £2265—thus showing an estimated surplus of £1594. With regard to the contributories, the paid-up capital of the Company is £9783; and, after deducting the estimated surplus as above, the total deficiency is returned at £8188. [The prospectus of the Company was unfavourably commented upon in the "JOURNAL" in 1914.] The Official Receiver's observations upon the case are to the following effect.

The winding-up order was made on Oct. 15, 1918, upon a creditor's petition presented on Aug. 27. The Company was promoted by the United Gas-Works Development Company, Ltd., on Jan. 26, 1914, with a nominal capital of £20,000, divided into 2000 7 p.ct. cumulative preference and 2000 ordinary shares of £5 each. It was formed to manufacture and supply gas, &c., in Narberth, Pembrokeshire.

The first Directors of the Company were Sir George William Kekewich, K.C.B. (Chairman), J. M. Rainsford, F. C. Murray, and Frederick Colman. Rainsford and Murray resigned on March 5, 1914, and June 27, 1916, respectively, and Colman died in November, 1916. William Judd, the Secretary, was appointed a Director on Dec. 5, 1916, to make a quorum. The remuneration of the Directors was fixed at £52 10s. a year each; £52 10s. extra being payable to the Chairman. Judd stated that the fees were paid up to May, 1915; thereafter the only payments on this account were made to Colman and to himself. Judd appeared to have housed the Company at No. 14, Victoria Street, Westminster, and furnished the secretarial work, for £120 a year.

A prospectus issued by the Company inviting subscriptions for the full amount of the authorized share capital, and dated Feb. 6, 1914, disclosed the following agreements entered into: (1) Between James Henry Silcox and the Development Company, dated Jan. 14, 1914, for the purchase by the latter Company of freehold property at Narberth North, with the gas-works, reservoir, and building thereon, and all machinery and plant, gas-mains, &c., for £1250. Coal, coke, lime, &c., on the premises were to be taken by valuation. (2) Between the Development Company and the Trustee for the Gas Company, for the sale to the latter Company of the property, &c., for £1500. (3) Between the Development Company and the Trustee for the Gas Company, under which the Development Company undertook to provide the preliminary expenses, agreed at £1500. (4) As to making necessary alterations and additions and laying further mains, and for underwriting £5000 of the Gas Company's capital by the Development Company at a commission of 7½ p.ct. The last three agreements were dated Jan. 26, 1914.

Judd stated that no valuation of the property was made. A print of a report by Mr. G. A. Smith, "gas engineer," addressed to the Directors and dated Jan. 17, 1914, accompanied the prospectus, and showed an estimated consumption of gas (when the proposed extensions had been carried out) of 24,500,000 c.ft. per annum, and an estimated net profit of £3042 3s. 7d.

Under the first part of agreement No. 4 the Development Company agreed to erect a larger gasholder and lay further mains necessary to carry the gas as far as Narberth Railway Station for the sum of £3500. The remainder of the agreement provided for further extensions to other districts; but Judd stated that, owing to the inability of the Gas Company to procure more cash capital, further extensions were not carried out.

The amount received in respect of share subscriptions was £8283. Out of this amount the following payments were made to the Development Company on Feb. 23, 1914, in repsect of the agreements referred to: No. 2, £1500, purchase price; No. 3, £1500, preliminary expenses; No. 4, £375, underwriting commission; and £700 on account of alterations and additions.

The balance of £2800 for the works to be carried out under agreement No. 4 was paid on April 21, making £6875 paid to the Development Company, The latter also received 150 preference and 150 ordinary shares, fully paid, as further consideration for agreeing to provide the preliminary expenses. These shares were allotted on March 17, 1914, and were soon disposed of by the Promoting Company.

A considerable profit appears to have been made by the Development Company in connection with the works' contract, and also in respect of preliminary expenses—the amount expended by the Development Company apparently not exceeding £3076, out of the total paid to them by the Gas Company of £5000.

There did not appear to be any reason why either the work or preliminary expenses should not have been undertaken by the Gas Company direct, at a saving of about £2000 in addition to the bonus shares referred to above.

The consideration under the above contracts was apparently paid over without any accounts being called for by the Gas Company's Directors.

In November, 1914, serious leakages and loss of gas were reported in various parts of the town; and Judd stated that this necessitated opening-up the ground, when it was found that some of the old mains were worn-out and had to be replaced.

In July, 1915, the Company appeared to have been short of cash, and borrowed £500 from the Wilts County Gas Light and Coke Company, Ltd., upon the security of debentures covering the undertaking and all property and assets present and future—including uncalled capital. Judd, who was also the Secretary and a Director of the Wilts County Gas Company, was appointed Receiver and Manager on behalf of the debenture holder on March 12, 1917.

The Receiver carried on the works and negotiated for their sale to the local authorities, but without success. The property was also advertised for sale; and ultimately the whole assets, which had cost the Company at least £5000, were disposed of (with the sanction of the Court) for the sum of £1250.

The Development Company guaranteed the payment of dividends of 7 p.ct. on the preference shares and 8 p.ct. on the ordinary shares; and these were paid out of £72 12s. provided by that Company.

The failure and insolvency were attributed by Judd to the unexpected outlay necessitated by having to replace old and leaky mains (the cost of which the Company thought it unwise to put upon the consumers) and inability to raise further share subscriptions to carry out the whole of the extensions proposed. The Official Receiver was of the opinion, however, that the Directors contributed to the failure by contracting with the vendor Company in the manner indicated.

As a result of the meetings of creditors and contributories held on Jan. 9 and 16, 1919, the Official Receiver remains the Liquidator of the Company.

Shipley and Clayton Lighting.—A series of assaults of late has led to a crop of bitter complaints regarding the badly-lit streets; and an improved lighting of the streets is to be at once instituted. The people resident in Clayton who are supplied from the Bradford mains are to be provided with a more modern type of gas-lamp so soon as supplies can be obtained.

London County Council and Tar for Roads.—Dealing with the report of the Departmental Committee on Road Locomotives and Heavy Motor Cars, the General Purposes Committee of the London County Council say the evidence appears to show that, as regards the more modern forms of road construction in which tar, pitch, or bitumen is used as a binder or matric, the evidence is conflicting; but there would appear to be no doubt that roads of this class, if properly constructed and maintained, will carry a considerable volume of heavy traffic without undue damage.

MR. DOIG GIBB'S BURNLEY REPORT.

In his report to the Town Council of Burnley on their gas undertaking [to which reference has already been made in the pages of the "JOURNAL"], Mr. W. Doig Gibb, O.B.E., M.Inst.C.E., refers first of all to his examination of the works, the site which is being held for future contingencies, and the abstracts of the Treasurer's accounts from 1913 to 1919. He then proceeds as follows:

WORKING CONDITIONS DURING THE WAR.

These were such as to render it impossible to maintain the financial prosperity of pre-war years. Everything was against it: (1) Increase in cost of coal, oil, and all other materials, while the price of residuals was, in some cases, severely controlled. (2) Increase in cost of labour, want of labour, and less efficient labour when procurable at all. (3) Poorer coal, giving less favourable working results. (4) The ill-health of the Assistant to the Engineer at a time when Mr. J. P. Leather (the Engineer) was up-against extraordinarily difficult local and Government conditions. (5) Decrease in quantity of gas sold per annum, with so-called "standing charges" steadily increasing. (6) The belated and inadequate "temporary relief" given by the Board of Trade.

Nor could a pre-war service of gas to consumers be maintained. This was impossible; some of the reasons being: (1) Poorer quality of coal, and more irregular deliveries. (2) Restriction in supplies of gas oil. (3) Irregularities in the working results of labour employed. (4) The varying instructions as regards the manufacture and the quality of the gas to be supplied, which were issued from time to time by Government Departments. (5) The impossibility of maintaining the gas-producing plant in a normal state of repair, resulting in an unduly large percentage of inerts in the gas supplied.

FINANCIAL POSITION INEVITABLE.

The consequences were that the consumers got at certain critical times, gases of varying quality, supplied at varying pressures. This is always irritating, and naturally leads to complaints. In my position as Technical Adviser to the Department of Explosives Supplies, Ministry of Munitions, during the war years, I was responsible for the maintenance of a proper supply of gas to all essential factories. This kept me in touch with all important gas undertakings. I have therefore considerable knowledge of the Burnley difficulties and the efforts which were made to overcome them. It is my opinion that your present financial position was inevitable, that the supply and quality of the gas was kept up as far as it was possible to do so, and that there should be no suggestion made that your Gas Engineer and your Gas Committee did other than the best possible under the extraordinary circumstances with which they were faced. The Burnley history, during the war years, contrasts favourably with many other gas undertakings.

THE PRESENT CONDITION OF THE WORKS, IN CONSEQUENCE OF THE WAR YEARS.

Generally, this compares favourably with works of similar size and age. Repairs and overhauling are required; but these are in hand. The condition of the works, after the war years, reflects credit on the management. This is specially the case in the distributing system. It is the almost universal experience that the percentage of unaccounted-for gas has been steadily on the increase. This has been due to roads in bad condition and heavier traffic on them causing more leakage on the mains, and there being less available labour to remedy this, and also because the consumers' meters, through lack of attention, have been registering slow. In your case, the percentage of unaccounted-for gas was 2·77 in 1913-14, and 2·78 in 1918-19. These are most satisfactory figures at any time, but specially so in the latter period.

DESIGN OF EXISTING GAS-WORKS, DISTRIBUTING PLANT, &C.

These represent skill and thought in their design and arrangement. Having regard to the ages of the different parts and their consequent design, I cannot say that the plant is ideal for the present circumstances of gas manufacture, or will be ideal for the new conditions which the Board of Trade are likely to lay down. But, at the times of erection, they represented the best practice; and a gas undertaking cannot always be scrapping useful and costly plant in order that all parts may be completely up-to-date. Your works are serviceable ones. I am not disposed to record any criticism, because such things as the cheaper handling of coal from barge to store at the north end of the canal, the commercial balance-sheet of the future which may result in the replacement of inclined retorts by the latest type of vertical retorts, the erection of a larger sulphate of ammonia plant when the present one is worn out, and other like matters, are all, to my knowledge, having the intelligent attention of your Engineer. I noted, with satisfaction, the installation of a well-designed and cheaply erected tar distilling plant. This is a proper step to have taken.

The distribution system of mains is excellent; and the main arteries are of very ample size. As it is in every undertaking, there are some of the smaller mains getting too small for their work; but the replacement of these is in the usual routine of working. There are very few systems in the country where an initial pressure of 3 in. gives (unless at a few weak spots) a terminal pressure of 2 in. This is your record. These weak spots are being remedied by auxiliary high-pressure mains (holders to Rosegrove and holders to Harle Syke); and the high-pressure plant is capable of taking more work up when it is required to do so in the future. The storage and other plant at the holder station is in good order, having regard to the age of the different portions. The street lighting is evidently well attended to.

PROSPECTS FOR THE FUTURE.

Your undertaking cannot come back all at once to its pre-war prosperity. Cost of material and labour prevent this; and you are further handicapped by the less consumption of gas in the mills, partly due to shorter hours of labour. On the other hand, there is not so much lee-way to be made up as there is in many other gas concerns. You have more efficient labour now (at a price), and you have got temporary relief—belated and insufficient as it is—and the hope of more relief through impending legislation. I also attach considerable importance to the reorganization of the staff, by which you have secured a draughtsman and an assistant, who, I believe, are both capable of doing excellent work. I do not wish it to be inferred from this last remark that your engineer's management and methods need improvement, but rather that he will have more time to "manage," and not have so much of his time taken up by the numerous minor details, which can be efficiently performed by competent assistants.

Mr. Ross, the Public Analyst, does not come under the strict category of "assistant." The future success of gas-works will depend to a considerable extent on chemical knowledge. While your Engineer has chemical knowledge above the average, it is an asset of very considerable value to the Gas Committee and Mr. Leather to have the advice and assistance of such an able chemist as Mr. Ross. I have come to the conclusion that he is whole-hearted in the gas-works interests, and is one who, by his attainments, energy, and cordial co-working with the Engineer, has done, and will do, most valuable work. There are not many gas undertakings which are so fortunate in this respect.

I am sure your undertaking will emerge from under the present cloud; but I advocate patience and a steady continuance of decisions based upon the existing and possible future circumstances.

THE POLICY FOR THE FUTURE.

This, undoubtedly, will be the manufacture of a gas as nearly as possible of constant quality in thermal value, low percentage of inerts, and specific gravity, distributed to consumers at efficient and constant pressure. Approaching legislation will probably include most, if not all, of these points; but the limits imposed will be penal limits, and not necessarily the working limits used by any gas undertaking. As regards thermal value, it is probable that undertakings will be allowed to settle this for themselves, and be compelled to charge for gas supplied on a sliding-scale based on thermal value.

The combination of your gas producing plant is capable of manufacturing gas with a large range of possible quality. It will be difficult to keep this at the steady, constant quality in thermal value, percentage of inerts, and specific gravity which is, or may be, the ideal. You have three types of plant—inclined retorts, vertical retorts, and carburetted water gas. The gas produced from all three will vary in composition; and it will be difficult, through varying consumption, necessity for repairs, &c., to balance the manufacture of these three gases (or two if one be off) to, at all times, maintain a constant quality. The difficulty is increased by the small amount of gasholder capacity. This, in four holders, makes a total of 2¼ million c.ft. Some 3¾ million c.ft. have been sent out in one day, or, taking the average day of the heaviest week's consumption, over 3¼ millions. The make of gas has at least to balance this latter figure; so that there is storage capacity for about 18⅓ hours of the heaviest make. This is too low, and additional gasholder accommodation is required to provide at least 24 hours' storage of the maximum make. It will be obvious that shortness of storage prevents such a chance of mixing the gases before distribution as would otherwise be the case.

As regards distribution, I have already said that your plant is efficient. Good pressures must be maintained and, in my opinion, the present ones increased. Up till a few weeks before my visit, a constant initial pressure of 3 in. throughout all the 24 hours of each day was maintained. This has now been altered to a "step" initial pressure depending on the consumption. This proper alteration might usefully have been made at an earlier date. I am sure the future will show the desirability of increasing still further the initial pressures now being given, even though this should involve the increased use of service governors. The new penal limit likely to be enforced is 2 in. pressure at the extremity of any main of not less than 2 in. internal diameter. This being a penal limit, the terminal working pressure will have to be at least 2½ in. to be safe, and will preferably be 3 in.

While a portion of the Old Hall site is rough, and not well adapted for gas-works development, the site, taken as a whole, and served as it is by railway and canal, is probably the best which could have been secured. There is ample suitable land for the erection of gas plant for many years to come.

MR. DOIG GIBB'S GENERAL OPINION.

Mr. Doig Gibb concludes his report with the following words: I have no hesitation in expressing my opinion that your gas undertaking has been, and is, well managed and controlled.

The appointment of Mr. Doig Gibb to make the inquiry was the outcome of a motion by ex-Councillor James Sutcliffe, who now states that the report is not satisfactory to him. It does not answer the points he raised. He desires to ascertain the reason why other gas undertakings can obtain so much better results from their residuals than Burnley. He adds: "What I cannot understand is how, after spending £100,000 on the works, in ten years they should be obsolete. After reading the report of Mr. Gibb, I consider it very unsatisfactory, because he has not touched the question which prompted me to move the appointment of an expert; and I think the public of Burnley have the right to require an explanation of why one town can make over £60,000 from the sale of residuals, while Burnley can only make £24,000."

Lighting of the City of London.—Mr. M. Uchisaka, of Tokio, a member of the Japanese Illuminating Engineering Society, who is on a visit to this country in connection with public and domestic lighting, recently inspected the new lighting of the City of London. Fortunately, the reinstatement of the lighting to pre-war conditions enabled this to be done with every advantage. Mr. W. J. Liberty, the Public Lighting Inspector to the Corporation of London, accompanied our Japanese visitor, and explained in detail the various systems of illumination, and the mechanism connected therewith. After the visit, Mr. Uchisaka went for a three weeks' visit to Holland and Belgium; and, on his return to this country, he will leave for a tour of the cities in the United States before returning to Japan. Upon the question of public lighting in Japan, it seems that there is no regular system of street lighting in Tokio—each occupier has to suspend a light from his door to illuminate the thoroughfare; and as there are no regulations as to the character of the illuminant, one sees candles, oil, gas, and electric lamps in use.

EFFECTS OF ROAD TARRING ON INLAND FISHERIES.

Early in May last a Sub-Committee was appointed by the Joint Committee of the Road Board (now Ministry of Transport—Roads Department) and the Board of Agriculture and Fisheries, to consider what immediate steps could be taken to obviate damage to the fisheries as a consequence of the tarring of roads, to conduct experiments to ascertain the effects of washings from tarred roads on stream life, and to study practical means of rendering tar innocuous. The Sub-Committee have now been in existence for six months, have held fifteen meetings, and have initiated researches the nature of which are briefly described.

At the outset, pending experimental information, the highway authorities were advised to refrain from tar-treating roads in the vicinity of fishery streams, and to take steps to intercept flood water or unduly heavy rainfall reaching the streams direct from tarred roads, by diverting the water on to grass margins, or adjoining land, into catch-pits, or by other means depending upon local conditions. The replies to the *pro formâ* seeking information from the highway authorities as to their tarring activities during the year 1919-20 show that these authorities are keenly interested in the work of the Sub-Committee, and are alive to the precautions necessary for the preservation of the fisheries.

The experimental work of the Sub-Committee has been directed to the following main issues.

(1) The production of a road tar which could be recommended for use in the neighbourhood of fishing streams. The requirements of the Sub-Committee were placed before the management of the South Metropolitan Gas Company, who have produced a synthetic tar which is now under examination from chemical, biological, and engineering standpoints, in comparison with a standard Road Board tar. The preliminary chemical experiments reported on by the Government Chemist are promising; and the tars are now being submitted to a closer experimental scrutiny. Physiological experiments are being made, involving the examination of the influence of water extracts from tars of known composition on fish kept under standard conditions. For stocks of fish, the Sub-Committee are indebted to the Thames Angling Preservation Society who take an active interest in helping forward the experimental work. The engineering standpoint is being ascertained by surfacing suitable main roads in Hampshire hitherto untarred, and examining the washings off such roads before and after treatment.

(2) The search for a suitable site to conduct experimental work under natural conditions. The problem set was to find a site where an untarred road of convenient gradient, carrying heavy traffic, was in sufficient proximity to a suitable unpolluted stream. Such a site has now been secured in Hampshire for experiments on the following lines. During the coming winter on the land adjacent to the stream a series of fish-ponds will be excavated, prepared, and stocked with trout. Meantime, a careful survey will be made of the stream and its watershed, and records will be collected of the variations in stream flow, suspended matter, dissolved materials, and water temperature. Special attention will be given to the drainage off the road before it is tarred, and its influence (if any) on stream life. During the tarring season of 1920, a definite stretch of the road will be surfaced with tar to the Road Board Specification No. 1, and the drainage from it will be passed through the circuit of ponds containing fish. In their search for suitable localities and sites, the Sub-Committee are indebted to the Thames Conservancy. So exacting have been the requirements of the Sub-Committee, and so extensively have the highway authorities tarred the roads in the Home Counties, that a considerable number of sites have been visited; but only two have been found to offer the requisite conditions for experimental work, of which the more suitable has been chosen. The Sub-Committee consider that, under the most favourable conditions, the major experiment should be continued for at least a complete year, to study the cycle of stream life in so far as it responds to the influence of road washings.

(3) A search for a stream suitable for experimental work which can be shown, with a high degree of probability, to have been prejudicially influenced as a result of the introduction of washings from adjacent roads which have been tarred. Such a stream, when found, will be utilized for a "recovery" experiment by the diversion of all road-washings. The stream will be kept under observation; and periodical examinations and experiments will be made.

COLONIAL GAS ASSOCIATION, LTD.

Growth of the Business and Present Prosperity—Dividend Increase—More Capital to be Issued.

The Ordinary General Meeting of the Association was held last Tuesday, at the Cannon Street Hotel, London, E.C.—Mr. SAMUEL SPENCER in the chair.

The SECRETARY (Mr. A. J. Kingdon) read the notice calling the meeting and the Auditors' report. The Directors' report and the accounts were taken as read.

The CHAIRMAN, in moving their adoption, said this was the thirty-first anniversary of the Association; and the Directors were very pleased to put before the shareholders another record—making the seventh or eighth in succession. He felt confident the shareholders would be glad to know, in spite of the very onerous and anxious times that the past year's working had caused the Directors here and in Australia especially, and the staff and workmen at the fifteen stations, that the result was indeed so satisfactory. He had been a Director from the inception of the Association in 1888, and Chairman for twenty-five years; so perhaps it would be interesting to those present, and the absent shareholders when the report of the meeting was sent out, to be reminded of a few things that had taken place in the past. The Association started well, began paying dividends at the first, and went on increasing the dividends yearly until 7 p.ct. was paid. Then the disastrous Bank failures commenced, and many land speculations followed. This took place some twenty years ago; their own bank being one that felt the effects of the crisis. The Directors had to reduce the dividends for some five or six years, when things began to improve; and they had gradually since got back to the 7 p.ct. now to be declared. He had been hoping for some years this would be paid again; and he was very pleased and very thankful that he had lived to see it. The Directors were desirous last year of paying 7 p.ct.; and he thought they would have done it, had it not been for the war, which closed just at the time they were considering the report for the meeting. It was therefore decided that it would be wiser and more prudent only to pay 6¼ p.ct. They had every confidence that from now matters in Australia would continue to improve; and he believed all the Directors here and in Australia were sanguine enough to anticipate a growing rate of progress for the Association. Last year it was stated that better results would have been achieved had it not been for the difficulty of raising further capital, which was so much required for extensions at three or four of the works. As some extensions were bound to be made to cope with the increased consumption, a large amount of the reserve had to be used, with the ready assistance of their excellent bankers in Melbourne, who helped the Association so much to carry on business, and to meet the demands for gas. It was impossible to issue any ordinary shares; and out of 50,000 7 p.ct. preference shares, there were some 11,000 left. These were offered to the shareholders and friends at par, and applications were received for about 7000 during the year—leaving some 4000 now available for anyone wanting a sound investment. The necessary and contemplated extensions that were so much required needed a large outlay of capital; and later on the shareholders would be asked to sanction the issue of further preference shares to the extent of some 40,000, which would nearly complete the share issue. This issue would only be used as required, and would be judiciously spent in the best interests of the Association. For a sound investment, and in a thoroughly established business, he could not think of a finer holding than these 7 p.ct. preference shares which, with a tax of 4s. 6d. in the pound, gave a net sum of £5 8s. 6d. p.ct. As they were paying 7 p.ct. on the ordinary shares, and prospects were improving, the dividend on the preference shares was amply secured. Turning to the balance-sheet, the shareholders would have noticed the profits amounted to £18,568, adding the carry-forward to which gave £21,932 to deal with. After meeting all charges for the small amount of 5 p.ct. debentures, and interest, renewals, and depreciation, and paying 7 p.c. on the preference and ordinary shares, they would have £5606 left to carry forward, or some £2200 more than last year. It might be of interest to mention that the sale of gas for the year was 279 million cubic feet—over 10 p.ct. more than in the previous year—and that the average sale of gas was 11,379 c.ft. per ton of coal carbonized. Coal cost some £3700 more, due to the increased demand for gas. He was sure the shareholders, in common with the Directors, would be pleased to learn that the capital per million cubic feet of gas sold now stood at £926. Perhaps the shareholders would like to have a comparison of the 1919 balance-sheet with that of 1914—practically the duration of the great war. The sale of gas in 1914 amounted to £36,603, and residuals to £4999. At the end of June last the figures were respectively £80,000 and £20,004. Their Managing Director (Mr. S. E. Figgis), in a letter recently received, remarked: "When we consider how little the Association has suffered in the face of lack of capital, and of how the business has increased by leaps and bounds, we surely have much to be thankful for. As alluded to before, we have much increased business in front of us; and two new gas-holders must in the near future be provided. Had it not been for the strike of seamen in June, our increased sale of gas would have been a further 5 per cent." After deducting £2576 for depreciation, adding £562 to the reserve fund, and increasing renewals fund from £4597 to £8410, the net profit available for dividend, with the £3363 brought forward from last year, was £15,371. In conclusion, he ought to mention that their much respected Managing Director had sent in his resignation to end this year, as he wished to be relieved of this part of his work, but he would still remain as a Director. Mr. Figgis had been with the Association nearly six years; and his assistance during that time had been highly appreciated. The Board were glad he was continuing to be a member of the local Board.

Mr. CHARLES HUNT seconded the motion, which was unanimously carried.

The CHAIRMAN proposed a dividend on the ordinary shares at the rate of 7 p.ct. per annum, less income-tax, for the year ending June 30 last.

The Hon. Sir JOHN W. TAVERNER, K.C.M.G., in seconding, said he was sure the shareholders would agree with him when he told them that, having regard to the conditions prevailing in Australia, the Company had done exceedingly well to be able to increase its dividend from 6¼ to 7 p.ct. He should like to take advantage of this opportunity in the presence of Mr. Weir, one of the Melbourne Directors, to say how much they all appreciated the excellent management of their affairs in Australia; and particularly did he say this because they had gone through one of their longest and most serious strikes, which ran on for about twelve weeks; and it effected this Company very much. Fortunately, through good management and foresight in Australia, and having coal, they managed to pull through, and were able to pay the shareholders the increased dividend of 7 p.ct. He was not going to prophesy what was going to occur in Australia in connection with labour troubles. They had their labour troubles here, and all over the world; and he was inclined to think that it would take some two years or so before they would get back to anything like normal times. When they reached these times, there would be for normal production a difference in costs, which had been forced upon the Company from time to time by the Arbitration Courts.

The motion was carried unanimously.

Mr. F. R. SMITH had much pleasure in proposing the re-election of the retiring Directors—Mr. Spencer and Mr. Hunt. Mr. Spencer was that day entering upon his twenty-sixth year as Chairman of the Association. They congratulated him, and thanked him for all he had done for the Company. Only those who had been intimately con-

nected with him knew of the great interest he took not only in getting new capital, but in every phase of the business he had been able to do for them what few chairmen could have done. The name of Mr. Hunt was a household one in the gas industry. He gave the Association of his wide experience; and they were to be congratulated upon having him as a Director.

Mr. H. KING HILLER seconded the motion, remarking that the success of the Association over all these years was due very largely to the enthusiasm of the Chairman, and the capability of Mr. Hunt. Had it not been for them, the Association would not have come through these difficult times so well as they had done.

The motion was cordially carried.

Mr. W. CHAFFER proposed, and Mr. H. S. WHILE seconded, the re-appointment of the Auditors (Messrs. Wood, Drew, and Co.); and this was agreed to.

The CHAIRMAN proposed a vote of thanks to the Chairman (Mr. P. C. Holmes Hunt) and members of the Local Board, and the staffs at the works and offices. He should ask Mr. Weir, one of the local Directors, to respond to the vote. They had had a very anxious time in Australia, although the Association only experienced about one month's difficulty with the strike business, which went on, he believed, for over twelve weeks. What it had done for the Association this year, they did not yet exactly know. But it had meant some few million cubic feet loss in the sales; but since then the increase had been going on at an accelerated pace. Their increase would probably have been 15 p.ct. had it not been for the strike. He had, however, hopes that they would pick-up what they had lost. Fortunately, they were not very far away from the coal-fields; and unlike many other Colonial gas undertakings, they had not to pay an enormous amount for freight. One company he had heard of had been paying £8 for their coal delivered on to the works. It was something to be thankful for that the Association had not this difficulty. He did not like to prophesy, but, so far as he could see, they might have another record year to report next time the shareholders met.

The Hon. Sir JOHN TAVERNER seconded the motion, which was very heartily carried.

Mr. WEIR said he should have much pleasure in conveying the resolution to the management and the employes generally in Australia. As the Chairman had remarked, they passed through some very anxious times last year; and he felt that the way they had come through was largely due to the management and the members of the staff who were intimately connected with the various grades of employment. They had a very loyal staff at every one of their works. The local managers did their very best to further the interests of the Association. Like the Chairman, he did not feel inclined to prophesy; but he did think the future held out every encouragement for them, and that the results would be by no means less than they had been in the past—in fact, in spite of the set-back last year, he thought they would see an improvement this year. The Footscray works were going ahead by leaps and bounds. It was surrounded by growing factories, which were up to date and would require gas for manufacturing purposes. They had also a growing suburb at Footscray which would be greatly added to by the new tramway system that was being constructed from Footscray into the outer district. On the other side of Melbourne, in the Box Hill area, they had also a growing population; and when the line was electrified (as the whole of the Melbourne Metropolitan system was to be before long, this would bring Box Hill ten minutes nearer to Melbourne. Without being at all rash, he thought that they could look for a steady increase there. He believed it would be seen that their anticipations would be realized.

Extraordinary Meeting.

An Extraordinary General Meeting was then held for the purpose of considering, and (if thought fit) passing the following resolutions:

That the number of 7 p.ct. preference shares of £1 each to be issued, be increased from 50,000 to 90,000, and that such alteration take effect as from the 1st day of January, 1920.

That the Directors be authorized to issue such additional preference shares as and when they shall think fit, and in such manner, and upon such terms as they shall determine.

The CHAIRMAN, moving the adoption of the resolution, said for the reasons given in his remarks at the ordinary meeting, it was essential that the Directors should ask for power to raise additional preference shares to the extent of about 40,000 7 p.ct. shares, which would nearly exhaust the amount of the present authorized share capital. This was necessary to enable the Association to carry out the extension of their business. The money would be spent with the utmost care. It was hoped the shareholders and their friends would take up the shares, and so enable the Board to lose no time in making arrangements to meet the large increased business that was being offered, and that could be worked so profitably. The shareholders would have gathered from his former remarks that the extensions were imperative. He might mention that at their largest works since 1914 the consumption of gas had gone up from 45 to 121 million cubic feet, and with prospects of reaching 200 millions at an early date—the works being in a great industrial centre of Melbourne. The shareholders knew that the authorized capital stood at £250,000. When this was exhausted, they would have to get further capital, either by the issue of shares or by loans from the bank, because progress was going to be very considerable. They could with great benefit have spent £100,000 if they could have got it. If they could obtain £40,000 in the current year, this would meet requirements for the time being; but they would then be bound to have a further meeting to authorize additional capital. With 7 p.ct. on the ordinary shares, he did not think they could have better or safer security, particularly with the great future which they all believed was in store for Australia. Their excellent colleague, Mr. Weir, had told them what was going on there; and with Mr. Philip Hunt, Mr. Figgis, and Mr. Weir there, they were in safe hands.

USE Simmance's

DEAD BEAT INDICATORS

instead of WATER-TUBE GAUGES and

"READ THE PRESSURE BY THE POINTER."

No liquid to evaporate and no levels to adjust.

No glasses to break and nothing to clean.

Direct reading, Open scale, Any range (Pressure, Vacuum, or Combination).

Incorrodible, Accurate, for foul or purified gas.

MADE IN MANY RANGES WITH TABLETS LETTERED AS DESIRED.

ALEXANDER WRIGHT & CO., LTD., WESTMINSTER.

Agents: Australia—FYVIE & STEWART, 360, Collins St., Melbourne; Canada—W. P. ROPER, 502, Merchants' Bank Building, Montreal.

Mr. HUNT seconded the resolutions; and they were unanimously adopted.

Mr. W. CHAFFER proposed, and Mr. H. F. HILLS seconded, a hearty vote of thanks to the Chairman and Directors.

This was cordially passed; and the proceedings terminated.

COMPETING FOR STREET LIGHTING.

An Electrical Disability.

Dealing with the possibility of further street lighting by electricity, the Hull City Electrical Engineer states that it is correct to say that the electricity undertaking at the present time has mains laid in not more than one-third of the total mileage of the city streets. Any general electric lighting scheme, therefore, would involve a capital outlay in cables which, to a very considerable extent, could only be used at present for street-lighting purposes. The standing charges of a scheme of this kind would thus be of such magnitude as to render it non-competitive with any existent system of gas lighting.

Proof of the accuracy of this generalization may be adduced from the fact that in England no city of any magnitude has adopted electric lighting in its entirety. It must not be assumed from the foregoing that, given similar conditions, electric lighting cannot compete with gas. But at the present moment the conditions are not similar for the reasons stated; and the problem is rendered the more difficult by reason of the high cost of any new capital works.

It would appear, therefore, that the present is not a suitable time for a wholesale scheme of this character.

BLACKPOOL GAS DEPARTMENT JUBILEE.

In November, 1869, the gas estate at Blackpool was taken over from the Lessees; so that the Corporation have now had the works in their possession for fifty years. To show the results attained during this lengthy period of municipal management, the Engineer and Manager (Mr. William Chew) has got out some striking figures.

At the time the works were taken over, there were 1200 consumers, which figure by Nov. 1 of this year had grown to 18,000; while the annual make of gas has gone up from 15 to 750 million c.ft. Thus the consumers have increased fifteen times, and the annual make of gas fifty times. During the first twenty-five years, gas had no competition to meet in the distribution of light, heat, and power; whereas since then the reverse has been the case. The price of gas in 1869 was 5s. per 1000 c.ft.; the pre-war rate in 1914 was 2s.; and the present charge is 3s. 4d. The whole of the capital cost of the undertaking (£245,000) has been borrowed on the security of the borough rates. There are now loan charges amounting to £16,200 per annum; and the surplus is principally applied to the relief of the rates.

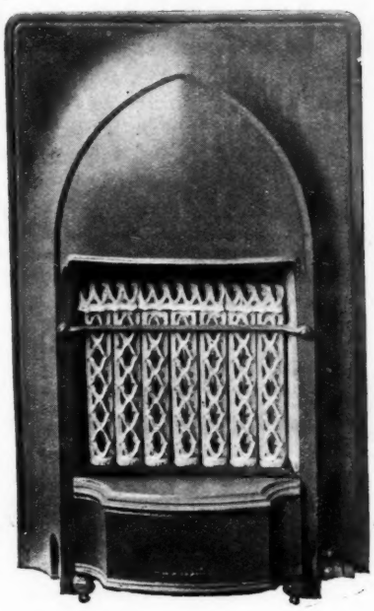
During the fifty years' period, the profits have yielded:

£300,000	applied to rates.
25,000	,, to other town purposes.
10,000	in reserve fund.
150,000	set aside to repay the loan of £245,000, 70 p.ct. of which will be repaid in 1928.
£485,000	

GAS TOPICS AT THE NORTHAMPTON INSTITUTE.

Last Friday was the day for the presentation, by the Marquess of Northampton, of prizes and certificates at the Northampton Polytechnic Institute, St. John Street, E.C., where educational and social work of a highly important character is energetically, and very successfully, carried on, under the direction of Dr. R. Mullineux Walmsley, the Principal. The conversazione arranged for that evening was continued on the Saturday, when the building was thrown open to the whole of the members and students and their friends. On both evenings there was a full programme, of so varied a character as to include something for everybody—vocal and instrumental concerts in the large hall, demonstrations in the well-equipped gymnasium and swimming bath, and exhibits in different departments.

Another feature was a series of lecturettes; and one of these, on Saturday, was by Mr. S. Field, the Head of the Technical Chemistry Department, who kept his audience fully interested for half-an-hour or so on the subject of "Gas in a Home—Quality and Economy." In the probable new legislation regulating the basis of gas supply and charge, Mr. Field found a fruitful topic for discussion; and he explained, in a manner that could be easily understood by all, the details of proposals which at first sight may appear to the lay mind not a little complicated. He pointed to the importance of the gas industry of this country, as being the consumer of something in the order of 20 million tons of coal a year; and told his hearers that gas is one of the most efficient fuels we have. Every time we use gas, he declared, we are doing something—and a good deal—towards the welfare of the nation. We have certain reserves of coal; and the use of gas is one of the most economical methods of utilizing these reserves. It is estimated that the annual damage in industrial towns, due only to smoke, amounts to anything between £5 and £6 per head of the population. In this smoke there are lost the valuable bye-products of gas manufacture, to which he drew attention as additional evidence of the importance of the gas industry. We must, he went on, use gas economically, and be careful not to waste it. Being one of the most adaptable of fuels, as well as one of the most efficient, it is going to be



NEW "MAIN" FIRES.

THE new "Gothic" Gas Fires are now ready—also many other new designs. Every "Main" Fire will give daily dividends of comfort to your consumers. Don't allow the old type wasteful Gas Fires to continue in use. Replace them with "Mains," so making the most of your output and adding satisfied customers to your list for the good times ahead.

What quantity of New "Main" Lists may we send you?

R. & A. MAIN, LTD.

WORKS: Gothic Works, EDMONTON, N.18; Gothic Ironworks, FALKIRK; and Gothic Works, BIRMINGHAM.
SHOW-ROOMS AND BRANCHES: 25, Princes Street, Oxford Circus, W. 1; 82, Gordon Street, GLASGOW; 18, Severn Street, Deansgate, MANCHESTER; 6, Narrow Wine Street, BRISTOL; 97, Millfield, BELFAST; 333, Queen Street, MELBOURNE.

employed in very considerably larger quantities in the near future than it has been in the past. Proceeding to show how badly the gas industry was hit during the war, he said one cannot make gas out of ash, and the companies have been getting coal of which 25 p.ct. was ash. They have in different ways stood at an enormous disadvantage. Having proved the inability, through statutory restrictions, of "profiteering" on the part of the gas industry, he explained in popular terms the findings contained in the Beilby report. On the subject of quality, Mr. Field assured those present that they will in no wise be prejudiced should it be decided to supply a gas of lower calorific value. In a short time, he hopes, we shall all feel the great benefits of the changes which are coming over the gas industry as the result of research long delayed. This is his interpretation of the modern trend of gas.

CURRENT SALES OF GAS PRODUCTS.

The London Market for Tar, Tar Products, and Sulphate.

LONDON, *Dec.* 8.

Pitch still maintains its firm position in the London market, and the price is well over 80s. net per ton f.o.b. makers' works for export. There are good inquiries in this product for the Home trade. Considerable inquiries have been received from the Continent for liquid fuel. The price of creosote is reported to be 7d. net per gallon in bulk. Tar spirits are unchanged in value from the last quotation, and makers are still uninterested in 60's crude carbolic acid.

Sulphate of ammonia for the home agricultural trade is £21 per ton for 24½ p.ct. quality for the month of December, with an allowance of 10s. per ton to agricultural merchants.

Tar Products in the Provinces.

Dec. 8.

The average values for gas-works products during the week were: Gas-works coal tar, 40s. to 45s. Pitch, East Coast, 72s. 6d. to 75s. per ton f.a.s.; West Coast—Manchester, 65s. to 67s. 6d.; Liverpool, 65s. to 67s. 6d.; Clyde, 75s. to 77s. 6d. nominal. Benzol 90 p.ct., North, 1s. 8d. to 1s. 10d.; crude 65 p.ct. at 120° C., 1s. 0½d. to 1s. 1½d. naked at makers' works; 50-90 p.ct. naked, North, 1s. 8d. to 1s. 10d. Toluol, naked, North, 2s. to 2s. 1d. nominal. Coal tar crude naphtha in bulk, North, 8½d. to 9d. Solvent naphtha, naked, North, 2s. 8d. to 2s. 9d. Heavy naphtha, North, 2s. 2d. to 2s. 3d. Creosote, in bulk, North, liquid, 6d. to 6½d.; salty, 5d. to 5½d. Heavy oils, in bulk, North, 6½d. to 7d. Carbolic acid, 60 p.ct., 1s. 11d. to 2s. Naphthalene, £18 to £22; salts, £6 to £7, bags included. Anthracene, "A" quality, 7½d. to 8d. per minimum 40 p.ct.; "B" quality, nominal.

FROM A MARKET CORRESPONDENT.

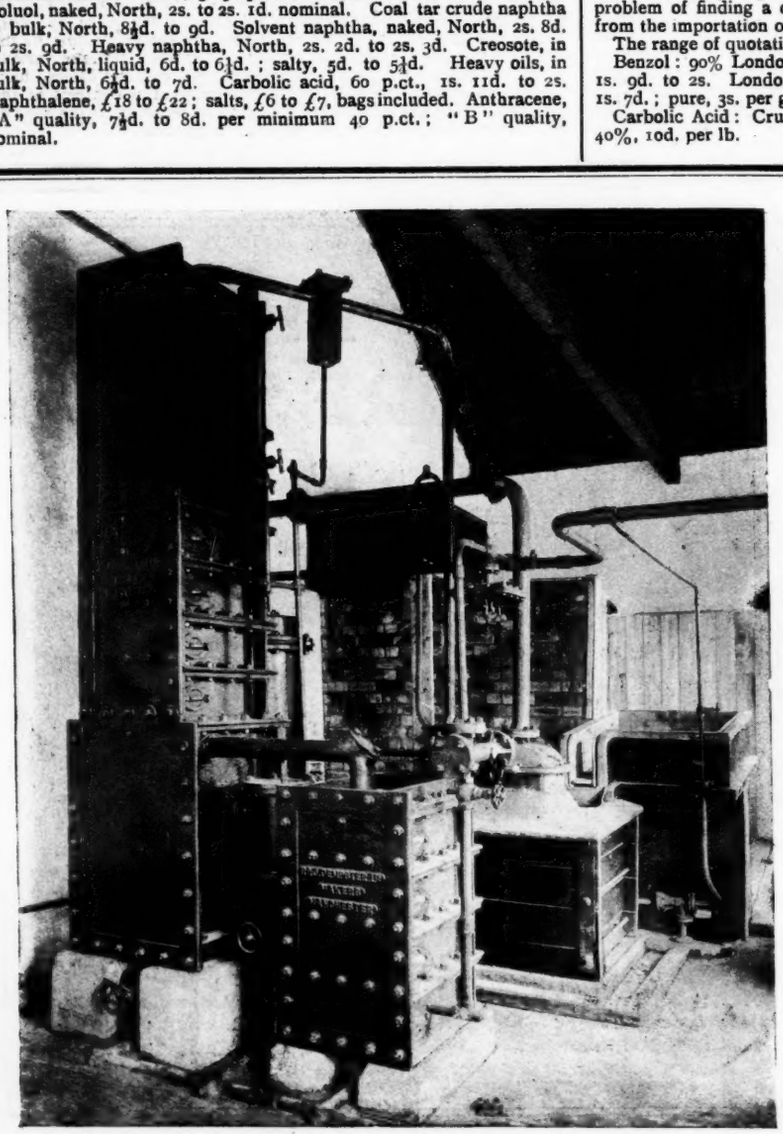
Tar Products.

Trade generally is upset by the coal situation, and makers of tar products do not know whether to sell or wait. The output of coal has certainly increased of late; but there is fear that this increase will be short-lived. Colliery developments are in abeyance, and some mines are closing-down, since it is impossible to keep things going on a flat-rate of profit of 1s. 2d. per ton. There is also the prospect of an increase in rail charges; and the delay in coming to a decision regarding this is producing considerable criticism. In South Wales the coke-ovens are working well, and bye-product outputs are increasing. In the North, conditions are also improving. Pitch is firm, without much alteration in London; but some irregularity is noted in Provincial centres. Some East Coast sales are reported to have been made at 90s. f.o.b.; but inland sellers seem unwilling to do anything, and have great confidence that high prices will last for six months longer at least. Solvent naphtha is in small supply; and its scarcity in Provincial centres particularly provides a feature of the market for the lighter products. Carbolic acid is steadily firm; and at current rates it is just about possible to turn out crude without loss. Crystals are fully sold-up for the present; and the tone of the market is much better. Creosote is exceedingly strong for fuel purposes, and is sold forward all over next year. Producers are reporting rather better terms. There is no change in benzol; and difficulty is experienced in obtaining supplies of crude. The results of the 10,000 mile test organized by the Automobile Association to settle the question whether or not benzol of a standard specification was satisfactory as a motor fuel, has now been made public. A simple calculation shows a considerable saving due to the use of benzol in preference to petrol. In the long run, this is not necessarily a saving; but in this particular instance it is so, since it has been effected with very little engine trouble or repair. Now that benzol of an approved standard has been shown to be satisfactory, not only from a running point of view, but also from that of economy, the use of it should be encouraged. The occasion is a very suitable one for extensive propaganda on the part of the National Benzol Association. On national grounds the use of benzol should be advised, since it is a home-produced fuel; and although it may not be able by itself to supply all our needs for transport purposes, it should go far to solve the all-important problem of finding a cheap fuel for power which will render us free from the importation of petrol.

The range of quotations is as follows:

Benzol: 90% London 2s. to 2s. 2d., North 1s. 11d. to 2s.; 50-90% 1s. 9d. to 2s. London, 1s. 10½d. North; crude, 60-65% 1s. 5d. to 1s. 7d.; pure, 3s. per gallon naked.

Carbolic Acid: Crude 60's 2s. 2d. per gallon nominal; crystals, 40%, 10d. per lb.



SULPHATE OF AMMONIA PLANTS.

ONLY ONE TYPE,

"THE BEST."

ENQUIRIES SOLICITED BY

R. & J. DEMPSTER, LD.,

GAS PLANT WORKS,

MANCHESTER.

Telephones: 54 and 2296 CENTRAL.

LONDON TELEPHONE: VICTORIA 7426.

Crude Tar: London, 50s. to 55s.; Midlands, 50s.; North, 50s. per ton *ex* works. Refined tar, 32s. 6d. per barrel (free) on rail.

Pitch: London, 80s. to 85s. per ton; East Coast, 72s. 6d. to 77s. 6d. per ton; West Coast, 72s. 6d. to 75s., with Manchester 72s. per ton and Glasgow 72s. per ton; South Wales, 75s. to 80s. per ton.

Solvent Naphtha: London, 3s. 2d. Provinces average 3s. 3d. per gallon.

Crude Naphtha: Naked, 9d.; North, 8½d. per gallon.

Heavy Naphtha: 2s. 6d. per gallon.

Naphthalene: Refined, £18 to £20 per ton nominal; crude, £6 10s. to £11, according to quality.

Toluol: Naked, 2s. 9d. per gallon nominal. North, 2s. 7d. Pure, 3s.

Creosote: London, 7½d.; North, 6½d. to 7d.; heavy oil, 6d. per gallon in bulk.

Anthracene: 40-45%, 9d. per unit per cwt.

Grease Oils: 18° Tw. (naked), £6 10s. per ton f.o.r. makers' works.

Aniline Oil: 1s. 3d. per lb.

Cresylic Acid: 95%, 2s. 5d. to 2s. 6d.; 97-99%, 2s. 7d. to 2s. 8d. *ex* works London, f.o.b. other ports.

Sulphate of Ammonia.

Business pursues an uneventful course, the higher prices which will prevail next year tending to earlier trading. There is very little fresh on the export side. Makers are reported to have on hand as many orders as they can conveniently handle for the present. The export value is about £26 per ton. It seems likely that the sources of ammonia will be largely augmented in the near future. The Government plant at Billingham-on-Tees is being offered for sale by private treaty; and although no further information has been disclosed as to the attitude of the English group who were reported to be negotiating, certain interesting possibilities are suggested by the recent grant to Brunner, Mond, & Co. of licences in respect of a number of Haber and Badische Anilin und Soda Fabric patents, all relating to the manufacture of ammonia. Cheap power is available at Billingham; and the site there is a good one—particularly from the point of view of the export trade.

The Directors of the European Gas Company, Ltd., have decided to pay on the 31st of January an interim dividend of 5s. per share, free of income-tax.

Owing to an accident at the electricity works at Bury, last Tuesday morning, the supply of current was cut off, causing a stoppage of tramway traffic for about an hour.

At Halifax, George Eldridge, steam-wagon driver, was fined £5, or a month's imprisonment, for false pretences, to the extent of five guineas, in delivering Corporation coke. He made out on his delivery tickets that he had taken more coke than was actually done. The Chairman said had there not been a lax system of checking delivery the man would not have had the temptation.

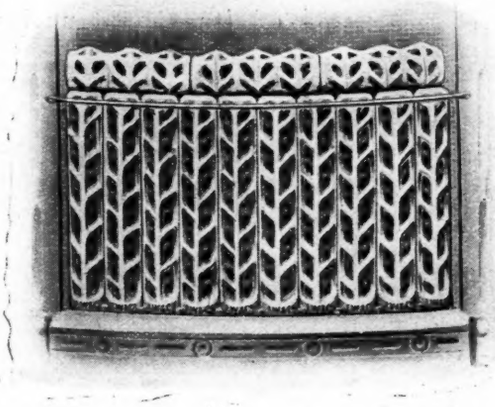
Lighting of the Talke District.—The Clerk to the Audley (Staffs. Urban District Council reported to a meeting of that body last week) with respect to the lighting of the Talke district by gas or electricity, that they were debarred from taking a supply of gas from the Talk-o-the-Hill Colliery, unless they promoted a Bill in Parliament, as the Kidsgrove Gas Light Company had statutory powers in the district. He pointed out that the cost of a Bill would be very great; and the Council decided to ask the Gas Company to move in the matter.

Ballymena Gas Undertaking.—The Irish Local Government Board Auditor, writing to the Ballymena Urban Council on his audit of the accounts for the year ended in March last, states that the gas undertaking receipts were £8613, and the expenditure £10,199. From the trading account prepared by a chartered accountant, and presented at the audit, the result of the year's working, allowing for the value of stock, materials, &c., and excluding a sum of £725 repayment of principal to the Board of Works, was that 'there had been a loss of £177, as compared with a profit of £723 for the previous year.

Gas Affairs at Macclesfield.—Alderman Isherwood (the Chairman of the Gas Committee), replying to criticisms at a meeting of the Macclesfield Town Council, said there were towns which were charging 5s. per 1000 c.ft. for gas which was worse than Macclesfield gas. The price in Macclesfield was 30 to 40 p.ct. less than the average charge throughout the United Kingdom; and, therefore, it was not exorbitant. Then, again, they were losing thousands of cubic feet of gas a year in consequence of one of the holders not being renewed; and this work would cost £12,000. As to the quality of Macclesfield gas, he contended it was better than that produced in Manchester.

Woodall-Duckham Verticals for Carnoustie.—It has been unanimously agreed by the Carnoustie Town Council to instal Woodall-Duckham retorts in their gas-works. When submitting the proposal, Provost Nicoll said that all through the war period the Gas Committee had been labouring under serious difficulties. If they could get a system which could give them 50 p.ct. more gas per ton of coal than they had been getting, this in itself was a sufficient recommendation for its adoption. When they had the installation they would be able to provide gas of a quality better than hitherto, and in course of time to get the whole equipment at the works thoroughly up to date.

Public Lighting in the Metropolis.—Some time since reference was made in the columns of the "JOURNAL" to the rating up of the street-lamps from war conditions to a normal state of lighting. This work was well in hand by the authorities in several parts of the Metropolis when the railway strike intervened, and by request of the Coal Controller the work was held-up in the interest of fuel economy. With the passing of that crisis and the greater production of coal by the miners, the limitations imposed have been removed, and the various lighting authorities, in conjunction with the gas companies, have taken up the work again. Thus the lighting of the streets of the Metropolis is once more on a fair way to completion; and the days of darkness and shadow will soon be things of the past.



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WRIGHT'S

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"Thermo-X"

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is unapproachable for . . .
Efficiency & Durability.

Large Stocks are available, and Orders can be quickly . . . executed. . . .

JOHN WRIGHT & CO.,
ESSEX WORKS, ASTON,
BIRMINGHAM.

New Ross Gas Strike.—A strike of the New Ross Gas Company's employees proved to be a serious matter for business people, as the gas supply was cut off for two nights. In the result a settlement was arrived at; the stokers being given £2 8s. to £2 10s. per week, and other men from £1 14s. to £2 7s. 6d.

Coal Price Reduction and Street Lighting.—Alderman Phillips (the Chairman of the Gas Committee), at a meeting of the Salford Council last Wednesday, said the latest Order in regard to the price of coal was not at all clear; and though it had been publicly announced that coke was to be reduced, no mention of this was made in the Order. The matter was not yet settled. He had written the Coal Controller asking whether or not gas used for street lighting came under the heading of "domestic supply. Until a number of points such as this were cleared up, it was impossible to say what the reduction in the price of gas would be.

Anticipating a Loss at Chelmsford.—The Chelmsford Corporation Gas Committee have been informed by the Town Clerk that the prices charged for gas supplied by the Corporation are ½d. per 1000 c.ft. less than the maximum prices authorized to be charged by the Chelmsford Corporation Gas Act, 1915, and the Chelmsford Gas (Temporary Increase of Charges) Order, 1918; and having regard to the continued heavy increases in the cost of labour and materials, the Committee were of opinion that the financial position of the gas undertaking had been adversely affected by circumstances arising out of the war, and that unless the Council obtained the necessary statutory authority to further increase the price of gas, it would be impossible to carry on the undertaking except at a loss. The Committee also had before them certain information prepared by the Gas Engineer (Mr. E. W. Smith), showing that on March 31, 1920, there would be an estimated loss of £1010. It was resolved to recommend that an application be made to the Ministry of Health for an Order to authorize the Corporation to make increased charges.

Position of the Manchester Gas-Works.—At a meeting of the Manchester City Council last Wednesday, Mr. Sutton called attention to the quality of the gas that was being supplied. The situation in Manchester, he said, was a serious one. Mr. J. Hart also raised a protest. Alderman Kay (the Chairman of the Gas Committee) said he welcomed the opportunity of explaining the situation. The Council, in the first place, should know that the whole of the reconstruction work at the city's gas-works had been held-up during the war. As a result, all the plant had deteriorated; and, in spite of controlled supplies, the consumption of gas had increased to an astonishing extent. The supply of cookers and gas-fires had no doubt been responsible for much of the increase. They could not even attend to normal repairs. The quality of the gas had never gone down to the point demanded by Sir Auckland Geddes. Any fault lay with the poor pressure; but this difficulty was gradually being overcome. He asked the Council and the public to exercise a little more patience. By Christmas, he was hopeful that a decided improvement would be effected.

Supply of Benzol to Motorists.—At Aldermaston the Automobile Association have installed a roadside fuel supply depôt in conjunction with their telephone box. Benzol is obtainable by members of the Association; and the telephone-box can be opened by the key which is supplied to each member. This is the first of a series of supply depôts which are to be erected.

Provisional Orders and the Price of Gas.—A letter was read at the last meeting of the Halifax Corporation, from the Ministry of Health, with regard to the proposal to obtain powers to increase the maximum price which the Corporation may charge for gas. The letter stated that the Ministry are not at the present time prepared to entertain an application for a Provisional Order for the permanent amendment of section 11 of the Local Act of 1855; but they would entertain an application to deal with the matter under the Statutory Undertakings (Temporary Increase of Charges) Act.

Dewsbury Gas Complaints.—At the Dewsbury Town Council meeting last week, there was much complaint regarding poor gas; and Alderman Dwyer alleged that the old excuse of bad coal was untrue now, and that the real reason was that the retorts purchased last September had not yet been erected. The Chairman of the Gas Committee (Alderman Pearson) admitted that the supply was anything but satisfactory, and said the best course was to call in an expert to tell them what was necessary. He quite admitted that they had now both coal and staff; and it was clear that they must look elsewhere for the deficiency.

Street Lighting at Halifax.—Mr. J. E. Bellamy moved in the Halifax Town Council that the street lighting be increased from 50 to 100 p.ct., and argued that war-time economy was not now necessary, and public safety should be considered before a penny or two on the rates. The Deputy-Mayor reminded the meeting that coal conservation was still vitally necessary, in addition to which the proposal would involve a difference of 2¾d. per pound on the rates up to the end of the current financial year. Mr. J. Burke reported that the Committee were already lighting more lamps in parts of the town where they were necessary. The Deputy-Mayor said he had permitted the discussion, but could not allow a vote, as the resolution did not comply with standing orders.

Loss on Wigan Gas.—In moving the adoption of the minutes of the Gas Committee at the last meeting of the Wigan Corporation, Mr. M'Curdy referred to the estimated loss on the half year ended Sept. 30 last of £6683, as compared with a loss of £9035 for the corresponding period of last year. He said the loss this half year would have been considerably less but for two items. One was the maintenance of public lamps, which was £1008, compared with £48 for the same period of last year. It was hoped that by next March this item would have disappeared from the balance-sheet. The other item related to gas stoves and fittings, which for the half year of 1919 cost £3093, against £3024 for the corresponding period of 1918. These were being purchased out of revenue.

Richmond's "IRONCLAD" Circulator

Illustrating the five parts of its Construction.

Part 1.

Outer Iron Casing without Joints, showing Inlets and —— Outlet. ——

Part 2.

Inner Iron Water Casing without Joints fluted inside —— and out. ——

Part 3.

Interior Central Vertical Cone for conserving and directing the heat.

Part 4.

Iron Fire-Box and Flue Outlet where all products —— are assimilated. ——

Part 5.

Iron Base and Powerful swing-out Burner with luminous jets.

Constructed throughout of cast iron (excepting Part 3, which is of mild steel), the "Ironclad" is practically indestructible and has no complicated parts to collect deposit or otherwise get out of order.

THE RICHMOND GAS STOVE & METER CO., Ltd.,

Academy Street, Warrington. 164-172, Queen Victoria Street, E.C.4

Gas Shortage in Banff.—Recently there was so great a shortage of gas in Banff that industrial consumers depending upon gas for power were brought to a standstill, and householders were without light and gas-fires. A local paper dependent on gas was delayed in publication.

Tar-Still Fatality in Sydney.—While engaged in repairing a tar-still at the Mortlake works of the Australian Gas Light Company, a man named Carrig was overcome by the fumes Two men who went to the rescue were also overcome; and in all three cases death had occurred before the recovery of the bodies. At the inquest, a doctor expressed the opinion that respirators should be supplied to the workmen, because the stills were connected one with another. On behalf of the Company it was stated that, in view of the fact that the apparently impossible could happen, every still would be completely isolated. At the time of the accident, all the cocks were shut-off.

Nottingham Gas Undertaking.—Further discussion took place at the last meeting of the Nottingham Corporation regarding the gas supply; it being referred to the Committee to bring up an early report on the question. Mr. J. Clarkson contended for improved street lighting, observing that Nottingham enjoyed the unenviable reputation of being one of the worst lighted towns in the country. Alderman Ball (the Chairman of the Committee) replied that it was entirely a matter of expense; and, as soon as there was an alleviation of present difficulties regarding coal supplies, the Committee were prepared to consider remedies. In speaking to a resolution demanding a higher illuminating standard, Mr. H. Bowles condemned the taking of £30,000 from gas profits in aid of rates—urging that, but for the continuance of this objectionable system, it would not have been necessary to increase prices to consumers to the abnormal extent to which they had recently been raised.

Skegness Gas-Works Purchase.—Since the acquisition of the Skegness gas undertaking from a private company, upon terms which were settled by arbitration, the Urban District Council have shown that they are far from satisfied with their purchase; and at the last meeting it was decided, by five votes to three, to appoint in January a consulting engineer "of eminence and integrity," to make a general survey of the concern, and advise the Committee as to the best course to be adopted. Mr. T. Marshall (the Chairman) declared that they did not feel quite easy regarding the undertaking; and the Sub-Committee who had had the matter in hand felt that a thorough examination by an expert would prove the most economical way out of their difficulties. Dr. B. Sweeten stated that a multitude of things were going wrong periodically; and it was high time that they understood where they were. Mr. S. Moody said they had already lost hundreds of pounds through being without expert advice. The Manager (Mr. J. H. Salmon) suggested that if the Committee had followed his advice, and not adopted such a "penny-wise and pound-foolish" policy, hundreds of pounds might have been saved. The appointment of a consulting engineer would not do away with the necessity of carrying out requisite repairs.

APPLICATIONS FOR PATENTS.

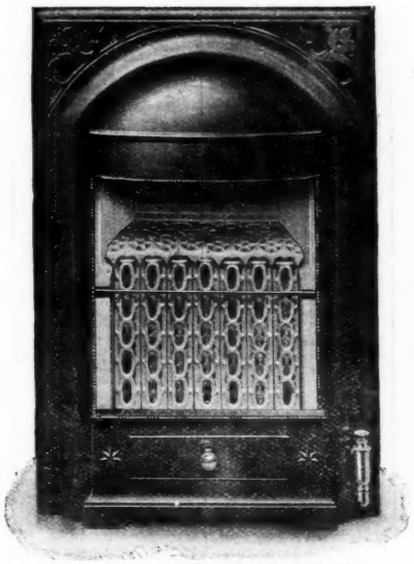
[Extracted from the "Official List" for Dec. 3.]

Nos. 29,153—29,847.

BAPTY, S. L.—"Gas-burners." No. 29,319.
BEILBY, G. T.—"Carbonization of coal." No. 29,817.
COKE & GAS OVENS, LTD.—"Coke-ovens, &c." No. 29,767.
COOKE, A. H. J.—See Coke & Gas Ovens, Ltd. No. 29,767.
CRUYT, L. C.—"Gas-burners." No. 29,609.
CURTIS, E. G.—"Lead connector for gas." No. 29,362.
DAVIDSON, W. B.—"Gas calorimeters." No. 29,631.
DOLPHIN, J.—"Atmospheric gas-burners." No. 29,777.
FLETCHER, C. G.—"Flexible expansion joints or unions for pipes." No. 29,658.
FODEN, A. J.—"Adhesives for skin lining envelopes, &c., for gaseous, &c., medium." No. 29,557.
GAZ PAUVRE ECONOMIQUE.—"Vaporizing apparatus for gas-producers." No. 29,846.
HEENAN, J. N. D.—See Cruyt. No. 29,609.
HELPS, G.—"Gas stoves, burners, &c." Nos. 29,571, 29,572, 29,573, 29,575.
HEWETT, F.—"Heating, ventilating, and vaporizing apparatus using gas, &c." No. 29,480.
HIRD, H. C.—See Foden. No. 29,557.
HOWLETT & Co., M.—See Dolphin. No. 29,777.
MORRISON, J.—"Air inlet casting for ascension pipes of product coke-ovens." No. 29,676.
ODDY, T.—"Distillation of coal, shale, peat, wood, &c., and retorts therefor." No. 29,347.
PERLICH, C. C. A.—"Gas-saving device for gas-cooking apparatus." No. 29,467.
SMITH, D. J.—"Gas-producers." No. 29,423.
SOC. ANON. DE TURBO-MACHINES.—"Working mixed gas and steam turbines." No. 29,394.
STILL, W. J.—"Internal combustion engines and gas-producers." No. 29,428.
TULLOCH, T. G.—"Gas-producers." No. 29,423.
YATES, H. JAMES—See Dolphin. No. 29,777.

The Borough of Tamworth have decided to instal 100 "A & M" patent pressure-wave automatic controllers on their street gas-lamps.

The Glasgow Corporation have appointed a Special Sub-Committee to consider and report on the proposal of the Fuel Research Board that gas be sold on a heat-unit basis, and what effect such proposal, if adopted, would have on the department.



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London County Council Approve the Bellby Report.—The report in which the Public Control Committee expressed approval of the report of the Board of Fuel Research [*ante*, p. 501], was adopted without comment by the London County Council at their meeting last Tuesday.

Sale of Gas Shares.—At Clitheroe, last Tuesday, 10 fully-paid £10 shares in the Haslingden Union Gas Company realized £10 per share; 223 fully-paid "B" shares being sold for £10 10s. each. A Clitheroe Corporation perpetual gas annuity of £5 17s., "class ordinary," and a 9s. annuity, "class B," sold for £143.

Tar Contract at Barrow.—The Gas and Water Committee stated at the Barrow Town Council meeting on Monday of last week, that Messrs. Sadler & Co., Ltd., had offered to increase their price for the surplus tar purchased from the Committee during the months of November and December by 5s. per ton—thus making the price 37s. 6d. per ton for the two months; also to revert to the arrangement in operation at the outbreak of war, and which was then suspended—namely, that they pay the mean price as quoted in the "GAS JOURNAL." It was resolved that the offer be accepted.

Gas Oil for Barrow.—Mr. Barrie complained in the Barrow Town Council on Monday that the gas supply was not so good in the town as it ought to be. He said that the ratepayers were paying the top price, and should get the best article; and he proposed that the purchase of 40,000 gallons of gas oil, for delivery over the period ending March 31 next (at a price of 8d. per gallon, being ½d. per gallon less than the last purchased), be not approved. The Council rejected the amendment, and approved the recommendation of the Gas Committee to purchase the oil.

Newtownards Gas-Works Extensions.—The Newtownards Urban District Council have obtained the sanction of the Local Government Board of Ireland to raise a loan for £13,000, to be spent on new boilers and boiler-house, sulphate plant and house, and exhauster and compressor in duplicate and house. In addition to this, the Council are, as was intimated in last week's "JOURNAL," promoting a Bill in the ensuing session of Parliament for power to borrow £40,000 in order to carry out further extensions. These will include vertical retorts and an electric power house. The plans and specifications have been drawn up by Mr. Robert Scott, the new Engineer and Manager.

STOCK MARKET REPORT.

The promise of amendment in tone which was perceptible on the Stock Exchange at the close of the previous week did not materialize last week. Not a favouring factor could be found either at home or abroad, and the popular fancy sustained a shock by the fate of Premium Bonds. In result, increased weakness was the rule, and hardly a market could show a bright spot.

The gilt-edged market was as bad as any. In Home Government issues, the leaders had a bad time, and Friday's quotations were: Consols 50-50½, Funding 74-74⅜, Victory 80-80⅜, and War Loan 89⅞-90¼ (the lower figure being a record). Home Rails were mostly let alone, but were weaker wherever touched. Canadians were irregular, and Argentines gave way.

The Foreign Market appeared to be in bad case—unable to stand up against free Continental sales.

In the Miscellaneous group there was nothing to cheer at. Rubber and Oil were under a cloud, and perhaps Textiles and some Mines had the best time.

Business in the Gas Market was much on a par with the previous week in point of the volume of transactions and their distribution; but the tone was less firm. About the middle of the week a reaction from the recent advances in price set in; and this was not surmounted before the close. In the London Companies, Gas Light ordinary and South Metropolitan receded 3 each. Continental Union also was 3 lower, and Imperial Continental lost 5 points. Bombay fell ¼; but Newcastle-upon-Tyne advanced 2½.

Bargains done for cash during the week were as follows: On Monday, Bournemouth preference 9⅜. Brentford "A" 59½, Cape Town 7 7/16, European 12, Gas Light ordinary 67, 67⅛, 68, ditto debenture 52, 52⅜, Hastings and St. Leonard's 5 p.ct. 57½, 57⅝. ditto 3½ p.ct. 40⅜, Ilford debenture 62, Imperial Continental 144, 144⅜, 145, 145⅛, Primitiva 36s. 3d., 40s., ditto preference 66s. 3d., South Metropolitan 66¾, South Suburban 68½, ditto debenture 85, Tottenham "B" 53⅜, Aldershot 4 p.ct. debenture 61, Croydon "D" 80½. On Tuesday, Alliance and Dublin 49, 49 1/16, Brentford "A" 59, 59 1/16, 60, European 11⅜, Gas Light ordinary 66⅔, 67½, 68, ditto preference 66½, ditto debenture 52, Imperial Continental 143½, 144, 144½, 145, Monte Video 75⅝, 76⅜, Primitiva 36s. 3d., 37s. 6d., 38s., ditto debenture 70½, 71, South Metropolitan 67½, South Suburban 68½, Southampton 61¾, 61 13/16. On Wednesday, Bombay 5¼, British 26¼, European 11⅜, Gas Light ordinary 64½, 65½, 66½, 67, 67⅜, 68, ditto debenture 52⅜, Imperial Continental 139, 140, 141, 142, 143½, Primitiva 36s. 3d., ditto preference 65s., South Metropolitan 64, 64½, 65, 66, Tottenham "B" 53⅝, 54. On Thursday, British 26⅜, Gas Light ordinary 63, 64, 65, ditto maximum 45, Imperial Continental 138, Monte Video 74, Primitiva debenture (1911) 51½, South Metropolitan 63, 65, Tottenham "B" 53⅝. On Friday, Brentford "A" 61, Commercial 4 p.ct. 58¾, ditto 52½, ditto debenture 50, Gas Light ordinary 63, 64, 64½, ditto preference 65, ditto debenture 52½, Imperial Continental 137, 138, 139½, Monte Video 75½, South Metropolitan 62½, 63⅜, 63¾, 64, 65, South Suburban 68, Monte Video debenture 73, Southgate preference 77½, 78, ditto debenture 63, 63½.

In the Money Market there was an abundant supply to meet all demands, and rates were quite easy. Silver varied daily between 73d. and 75d. The Bank rate is 6 p.ct., as fixed on Nov. 6.

ANTE-WAR PRICES AND DIVIDENDS, LATEST DIVIDENDS, AND LAST WEEK'S BARGAINS.

Issue. £	Share	When ex-Dividend.	Ante-War Dividend & Bonus p.c.	Last Dividend.	NAME.	Closing Prices. July 30, 1914.	Present Prices.	Lowest and Highest Prices of Bargains.
189,049	Stk.	July 31	4	4%	Aldershot 4 p.c. Pref.	..	60—65	..
1,551,868	"	Sept. 26	2½	2⅞%	Alliance & Dublin Ord.	59—54	45—50	49—49 1/16
674,000	"	July 11	4	4%	Do. 4 p.c. Deb.	76—72	62—64	..
280,000	5	Oct. 30	7½	8%	Bombay, Ltd.	5⅞—6⅛	5—5½	5½
80,000	10	Aug. 28	15	12%	Bournemouth Gas and Water { 10 p.c.	29—30	19—20	..
883,110	10	"	7	7%	B 7 p.c.	15—15½	10—11	..
115,000	10	"	6	6/-	Pref. 6 p.c.	13½—14	9½—9⅝	9⅝
159,740	—	June 27	—	4%	4 p.c. Deb.	..	66—67	..
992,045	Stk.	July 11	14	37/-	Brentford A Consolid.	261—266	56—61	59—61
784,992	"	"	11	31/8	Do. B New	204—209	52—57	..
55,000	"	"	5	5%	Do. 5 p.c. Pref.	109—111	76—78	..
221,400	"	June 11	4	4%	Do. 4 p.c. Deb.	91—98	64—66	..
214,775	"	Sept. 11	11	7⅛%	Brighton & Hove Orig.	208—218	123—128	..
344,300	"	"	8	5⅛%	Do. A Ord. Stk.	154—159	84—89	..
988,500	Stk.	—	5	5%	Bristol 5 p.c. max.	..	..	..
680,000	20	Sept. 26	12½	10%	British	44—45	25—27	26½—26¾
190,000	Stk.	June 27	4	4%	Do. 4 p.c. Deb. Stk.	88—90	63—65	..
245,771	"	"	4	4%	Buenos Aires 4 p.c. Deb.	85—87	50—53	..
100,000	10	—	—	—	Cape Town & Dis., Ltd.	1¼—2½	6⅞—7½	7 1/16
100,000	10	Oct. 30	—	4½%	Do. 4½ p.c. Pref.	4—5	6½—7	..
100,000	Stk.	June 27	4½	4½%	Do. 4½ p.c. Deb. Stk.	70—75	61—66	..
157,150	"	Feb. 26	5	5%	Chester 5 p.c. Ord.	108—110	..	..
1,618,380	"	Aug. 14	5/9/4	33/4	Commercial 4 p.c. Stk.	106—108	56—61	58½
660,000	"	"	5½	26/8	Do. 3½ p.c. do.	103—105	52—57	52½
475,000	"	June 11	3	3%	Do. 3 p.c. Deb. Stk.	69½—71½	50—53	50
800,000	"	"	4	—	Continental Union Ltd.	76—79	32—37	..
300,000	"	"	7	—	Do. 7 p.c. Pref.	115—118	40—60	..
51,600	Stk.	Aug. 28	14½	12%	Croydon A 10 p.c.	..	135—145	..
278,400	—	"	11½	9%	Croydon B and C 7 p.c.	..	95—105	..
492,970	Stk.	—	6	6⅛%	Derby Con: Stk.	128—135	..	..
55,000	"	—	4	4%	Do. Deb. Stk.	103—104	..	..
1,002,180	10	July 30	10	5/0	European, Ltd.	17½—18	11½—12½	11⅞—12
16,398,975	Stk.	"	4/17/4	80/-	Gas Light & Coke { 4 p.c. Ord.	98—102	62—65	63—68
2,600,000	"	"	9½	26/8	3½ p.c. max.	76—79	44—46	45
4,062,385	"	"	4	4%	4 p.c. Con. Pref.	96—99	56—68	65—66½
4,674,850	"	June 11	3	3%	3 p.c. Con. Deb.	72½—74½	51—54	52—52⅝
150,000	"	"	10	10%	Coke 10 p.c. Bonds	..	..	..
82,500	"	Sept. 11	5	4½%	Hastings & St. L. 5 p.c.	..	57—62	57⅛—57½
258,740	"	"	3½	2⅞%	Do. 3½ p.c	37—39	40—45	40⅜
70,000	10	April 29	11	7%	Hongkong & China, Ltd.	16½—16¾	8¼—9½	..
86,600	Stk.	Aug. 28	9	8½%	Hornsey 7 p.c.	..	90—95	..
181,800	"	Sept. 11	7½	6⅜%	Ilford A and C.	151—154	88—98	..
65,780	"	"	6⅜	4½%	Do. B	115—118	67—73	..
85,500	"	June 27	4	4%	Do. 4 p.c. Deb.	92—94	61—64	62
4,940,000	"	May 14	9	4½%	Imperial Continental	156—160	137—142	137—145½
1,235,000	"	Aug. 14	8½	8½%	Do. 8½ p.c. Deb. Red.	84—86	84—87	..
235,242	"	Sept. 11	6½	6½%	Lea Bridge Ord. 5 p.c.	119—121	86—91	..
2,498,995	"	Feb. 26	10	42/6	Liverpool 8 p.c. Ord. { A B	211—213 146—148	..	..
806,088	"	June 26	4	4%	Do. 4 p.c. Pr. Deb. Stk.	..	..	..
165,736	"	Aug. 14	7/5/8	33%	Maidstone 5 p.c.	..	56—61	..
75,000	5	June 11	5	5%	Malta & Mediterranean	4½—4¾	1½—2½	..
250,000	100	Oct. 1	4½	4½%	Met. of Melbourne { 4½ p.c. Deb.	99—101	90—97	..
541,920	Stk.	Nov. 27	4	5%	Monte Video, Ltd.	11½—12	78—78*	74—76⅜
1,676,892	"	July 30	4½	8½%	Newcastle&Gatsh'dCon.	98½—99½	66—67	..
599,795	"	June 27	8½	8½%	Do 8½ p.c. Deb.	89—88	57—58	..
15,000	10	Sept. 11	—	11%	North Middlesex 10 p.c.	..	13½—18½	..
55,940	10	"	7/14/0	7%	" " 7 p.c.	14—15	9—9½	..
800,000	Stk.	Nov. 27	8	8%	Oriental, Ltd.	117—122	102—105*	..
60,000	5	Mar. 26	10	1/-	Ottoman, Ltd.	7½—7⅝	4⅝—5½	..
60,000	50	Aug. 28	18	7½%	Portsea, Island B	128—131	74—76	..
100,000	50	"	12	6⅜%	Do. C	118—121	66—68	..
949,980	5	April 29	8	—	Primitiva Ord.	5½—6	1⅜—2½	36/3—40/-
499,966	5	June 26	5	—	Do. 5 p.c. Pref.	4⅜—5	3½—3⅝	66/—66/3
591,800	100	Dec. 1	4	4%	Do. 4 p.c. Deb.	91—93	70—72*	70⅜—71
600,000	Stk.	July 30	4	4%	Do. " " 1911	..	49—52	51½
946,198	"	June 27	4	4%	River Plate 4 p.c. Deb.	85—87	49—52	..
150,000	10	Sept. 26	6	6/-	San Paulo { 6 p.c. Pref.	10½—11	7⅜—8	..
125,000	50	July 2	5	5%	5 p.c. Deb.	47—49	40—42	..
185,000	Stk.	Aug. 28	10	5%	Sheffield A	232—234	57—92	..
209,984	"	"	10	5%	Do. B	232—234	57—92	..
598,500	"	"	10	4½%	Do. C	230—225	80—85	..
133,201	Stk.	Sept. 12	4	4%	Shrewsbury 5 p.c.	..	..	..
90,000	10	Oct. 15	9	10%	South African.	10½—11½	12—18	..
8,609,895	Stk.	Aug. 14	5/4/0	80/-	South Met. 4 p.c. Ord.	111—115	62—65	62⅜—67½
250,000	"	July 11	—	5%	Do. Pref.	..	94—96	..
1,895,445	"	"	8	8%	Do. 3 p.c. Deb.	77¼—74½	51—54	..
224,890	"	Aug. 14	8½	5%	South Shields Con. Stk.	157—159	104—106	..
952,795	"	"	6	8⅜%	S'th Suburb'n Ord. 5 p.c.	114—116	68—78	68—68½
167,658	Stk.	June 27	6	6%	Do. 5 p.c. Deb. Stk.	116—118	85—88	86
647,740	"	Nov. 13	7½	8⅜%	Southampton Ord.	99—102	61—63‡	61⅜—61 13/16
121,275	"	June 27	4	4%	Do. 4 p.c. Deb. Stk.	..	63—66	..
190,000	"	Aug. 14	—	4½%	Tottenham { A 5 p.c.	185—188	70—76	..
792,275	"	"	6	8%	District { B 5½ p.c.	115—117	50—55	53½—54
191,255	"	June 26	4	4%	4 p.c. Deb.	87—89	64—66	..
183,880	10	Dec. 30	5	—	Tuscan, Ltd.	5—6	1—2	..
149,900	10	July 1	5	5%	Do. 5 p.c. Deb. Red.	93—95	45—50	..
238,476	Stk.	Sept. 26	5	5⅛%	Tynemouth 5 p.c. max.	108½—109	74—76	..
80,000	"	Aug. 28	8½	55/-	Wandsworth, Wimbledon, and Epsom— Wandsworth A 5 p.c.	151—156	85—90	..
955,686	"	"	6½	40/-	Do. B 5½ p.c.	129—134	69—68	..
108,075	"	"	—	28/6	Do. C	..	63—68	..
140,865	"	"	—	38/6	New Ordinary	..	69—68	..
959,000	"	"	6½	38/9	Wimbledon 5 p.c.	117—122	65—70	..
98,000	"	"	6⅛	40/-	Epsom 5 p.c.	121—126	65—70	..
88,416	"	June 27	8	8%	3 p.c. Deb. Pref.	86—89	49—51	..

* Ex Div.

Irish Gas Strike.—The dispute between the New Ross Gas Company and their workers has been settled with substantial wages increases. The town was in darkness for two nights. Following the settlement, it was decided to advance the price of gas 2s. 6d. per 1000 c.ft.

Meter-Rents at Stockport.—Alderman Padmore, in the Stockport Town Council, referring to the charges for stoves and meter-rents, said there was a strong opinion that the Gas Committee were exploiting the consumers—especially the small ones. He suggested that, having in view that cost of fuel used by the Gas Department was to be reduced, the whole position with regard to these charges should be reconsidered. If they were going to make any increase in respect of the cost of gas, it should be a direct increase. Alderman Welsh, in reply, pointed out that the cost of labour for attending to meters and stoves had increased; and there was the question of maintenance and repairs. Gas fires and meters had gone up 150 p.ct.; and it would not be fair to put it on the gas, which was already bearing its fair share of the burden. He hoped that in time the reduction in coal would bring about a lowering of gas charges; but there was no prospect of this at present.

Progress at Ashburton.—At a meeting of the Ashburton (Devon) Urban Council last Thursday, Mr. J. F. Baker gave a detailed statement on the gas-works undertaking since its commencement 20 years ago, and said that the passing for payment that night of the last instalment of the original loan closed a chapter in the history of the Council. The gas-rentals had increased from £397 in the first year of the Council's working to £729 in the financial year ended March 31 last; while the price of gas had increased from 5s. per 1000 c.ft. (lighting) to 6s. 8d.

St. Helens and Glover-West Vertical Retorts.—There is a proposal by the St. Helens Gas Committee to spend £67,500 on the installation of 48 vertical retorts, instead of 64 smaller retorts proposed in 1914, the present price of which would be £75,489. It is estimated that the retorts, which will be on the Glover-West principle, will produce the same quantity of gas with less labour, and save £14,284 in capital expenditure. The annual saving over the old retort-house is estimated to be £8000; so that the new retorts are expected to pay for themselves in less than ten years.

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See Illustrated Advertisement Nov. 18, p. 400.

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JOHN RILEY & SONS, Limited, Chemi- cal Manufacturers, Hapton, near Accrington, are MAKERS of Special SULPHURIC ACID, for Sulphate of Ammonia Making. Highest percentage of Sulphate of Ammonia obtained from the use of this Vitriol, which has now been used for upwards of 60 years. Reference given to Gas Companies.

OXIDE OF IRON.

SPENT OXIDE BOUGHT.

BALE & CHURCH, LTD.

33, ST. MARY AT HILL, LONDON, E.C. 3. Phone: Avenue 6680.

"TORTO" FIRE CEMENT.

BALE & CHURCH, LTD.

33, ST. MARY AT HILL, LONDON, E.C. 3. Phone: Avenue 6680.

"KLEENOFF," THE COOKER CLEANSER.

Tins for Sale to Consumers. In Bulk for Works Use.

BALE & CHURCH, LTD.

33, ST. MARY AT HILL, LONDON, E.C. 3. Phone: Avenue 6680.

BRITISH GAS PURIFYING MATERIAL.

ENGLISH BOG ORE AND NATURAL HYDRATED OXIDE OF IRON. SPENT OXIDE BOUGHT.

BRITISH GAS PURIFYING MATERIALS CO., LTD.

(W. T. P. CUNNINGHAM, Chief Proprietor and Managing Director.)

13, ARCADIAN GARDENS, WOOD GREEN, LONDON, N. 22.

Telegrams: "Bripurimat, Wood, London." 'Phone: Palmer's Green 608.

ALDER AND MACKAY, LTD. (ESTABLISHED 1850.)

WET AND DRY METERS, SLOT AND ORDINARY.

STREET LAMPS AND AUTOMATIC CONTROLLERS.

EDINBURGH. (See p. 574.)

HUTCHINSON BROTHERS, Ltd. FALCON WORKS, BARNSLEY.

MANUFACTURERS OF GAS METERS (Ordinary and Prepayment), "FALCON" INVERTED LAMPS for Street Lighting, INVERTED BURNERS and CONVERSION SET for Street Lamps.

SULPHATE OF AMMONIA SATURATORS and all LEAD and TIMBER WORK in connection with Sulphate Plants.

We Guarantee promptness with efficiency for Repairs.

JOSEPH TAYLOR AND CO., CHEMICAL PLANT ENGINEERS, BOLTON, LANCS.

Telegrams—"SATURATORS, BOLTON." Telephone 0848.

ROBERT DEMPSTER & SONS, Ltd., ELLAND, Gas Engineers and Contractors for CARBONIZING PLANTS on Horizontal or Vertical Principles, and Stoking Machinery. HANDLING INSTALLATIONS, including Coal Breaking, Elevating, Conveying Plants and Coke Screening, Storing and Telpherage Plants. PURIFICATION.—All Branches of Wet and Dry Purification. STORAGE.—Gasholders, and all forms of Gas Apparatus. Wire: "DEMPSTER, ELLAND." 'Phones: ELLAND 261, 262, 263.

ENQUIRIES SOLICITED

FOR Gas-Works Plant of Every Description; also SULPHATE OF AMMONIA and SULPHUR RECOVERY PLANTS.

C. & W. WALKER, LIMITED, DONNINGTON, NEWPORT, SALOP.

APPOINTMENTS, &c., VACANT.

WHEN Filling Vacancies, please REMEMBER THE CLAIM OF THE EX-SERVICE MAN, who, other Qualifications being equal, has the FIRST CALL ON YOUR CONSIDERATION.

THE UNIVERSITY OF SHEFFIELD.

APPOINTMENT OF ASSISTANT LECTURER AND DEMONSTRATOR IN FUEL.

THE Council are about to Appoint an ASSISTANT LECTURER and DEMONSTRATOR in FUEL. Salary, £300 per Annum.

Applications must be sent in by Dec. 20.

Further Particulars may be obtained from

W. M. GIBBONS, Registrar.

APPOINTMENT OF ENGINEER AND MANAGER.

THE Sleaford Gas Company, Ltd., invite Applications for the Appointment of an ENGINEER and MANAGER of the Company's Works as from the 31st of March, 1920.

Annual make, 40 Millions.

The Duties will include the Keeping of the whole of the Company's Books and Accounts, Control of the Works, Plant, Mains and Services, the Distribution over the District, and the General Duties of such a Position with the assistance of a Clerk and Collector.

Applications, stating Age and Experience of the Applicant, accompanied by *copies* of Three recent Testimonials, stating Salary required, to be sent to the undersigned, endorsed "Gas Engineer and Manager," by Saturday, the 20th of December next.

A good House, Garden, Coal, and Gas are found by the Company.

Canvassing not allowed.

H. WIMHURST, Engineer and Manager.

Gas-Works, Sleaford,
Dec. 6, 1919.

BOROUGH OF STOCKTON-ON-TEES.

APPOINTMENT OF GAS ENGINEER AND MANAGER.

THE Corporation of Stockton-on-Tees invite Applications for the Position of GAS ENGINEER and MANAGER. The Salary will be £750 per Annum. The person appointed will be required to Devote the Whole of his Time to his Duties and will not be allowed to engage in Private Practice.

Canvassing, either directly or indirectly, will be regarded as a Disqualification.

Applications, stating Age, Qualifications, and Experience, accompanied by *copies* of not more than three recent Testimonials and endorsed "Gas Engineer," to be sent to the undersigned not later than Twelve o'clock noon on Saturday, the 27th of December, 1919.

THOS. DOWNEY, Town Clerk.

KESWICK GAS COMPANY.

THE above Company require the Services of a WORKING MANAGER with practical Experience in Carbonizing and the Routine of a small Gas-Works. He must be a practical Fitter, competent to Lay Mains and Services and to Fix Meters and Cookers.

The annual make of Gas is about 23,000,000 c.ft.

Applications, stating Age, Experience, and Salary required, and accompanied by *copies* of not more than Three recent Testimonials, to be Delivered at my Office not later than the first post on Wednesday, the 17th inst.

J. H. BRODIE, Secretary.

Otley Road, Keswick,
Cumberland,
Dec. 4, 1919.

CHEMIST required by a Gas Company in the South of England making 750 Million Cubic Feet per Annum. Applicants must have had good previous Experience and be Capable of Carrying Out all Tests and Analyses as may be required on an up-to-date Gas-Works. Salary, £225 per Annum.

Address, giving full Particulars and Stating Age, together with *Copies* (which will not be returned) of not more than Three Testimonials, to No. 6802, care of Mr. KING, 11, Bolt Court, FLEET STREET, E.C. 4.

COUNTY BOROUGH OF STOCKPORT.

(GAS DEPARTMENT.)

THE Gas Committee invite Applications for a DISTRIBUTION SUPERINTENDENT to Take Entire Charge and Supervision, under the Gas Engineer, of their Distribution Department.

Applicants must be Experienced in Mains and Service Laying, Public Lighting, and thoroughly acquainted with Modern Gas Appliances and their Application and Use.

Commencing Salary, £300 per Annum. No War Bonus.

Applications, stating Age and Experience, accompanied by not more than Three recent Testimonials, endorsed "Distribution Superintendent," to be addressed to the Chairman of the Gas Committee, Town Hall, Stockport, not later than Saturday, the 20th of December, 1919.

ROBERT HYDE, Town Clerk.

WANTED, immediately, for Works of 9 Million make, a MANAGER, capable of doing Fitting Work and used to Machinery.

Apply, by letter, stating Salary, &c., to No. 6811, care of Mr. KING, 11, Bolt Court, FLEET STREET, E.C. 4.

CHIEF Draughtsman wanted for Gas Engineering Firm Constructing Bye-Product Plants and Buildings. Must be Capable of Estimating Quantities, &c.

Apply, by letter, stating Age, full Experience, and Salary required, to No. 6812, care of Mr. KING, 11, Bolt Court, FLEET STREET, E.C. 4.

FUEL Economist Wanted by a Large Iron and Steel Works—A Trained Scientist Experienced in Pyrometry and Gas Analysis.

Apply, by letter, with full statement of Training Qualifications and Experience, to No. 6800, care of Mr. KING, 11, Bolt Court, FLEET STREET, E.C. 4.

WANTED an Assistant with Knowledge of CHEMISTRY and DRAWING.

Applications, stating Age, Training, Experience, and Salary required, to be sent to the GAS ENGINEER, Council Offices, MALVERN.

DRAUGHTSMAN Wanted by Provincial Gas Company, with wide Experience in Structural Engineering and Design of Buildings and Plant for Gas-Works. Salary, £300 per Annum.

Apply, stating Age, Training, and Qualifications, also Works Experience, to No. 6810, care of Mr. KING, 11, Bolt Court, FLEET STREET, E.C. 4.

WANTED by a large South Country Gas Company, a First-Class DRAUGHTSMAN used to Gas-Works Construction. Salary, £5, rising to £6 per Week.

Apply, by letter, to No. 6813, care of Mr. KING, 11, Bolt Court, FLEET STREET, E.C. 4.

WORKS Foreman required for 350 Million Works in the Midlands. Eight-Hour Shifts. Good Mechanical Knowledge necessary. Wages, £4 10s. per Week.

ALSO MECHANIC used to "D.B." Machines and General Fitting Work. Standard Rate.

Apply, by letter, to No. 6804, care of Mr. KING, 11, Bolt Court, FLEET STREET, E.C. 4.

TINSMITH Wanted for Dry Gas-Meters on New Work and Repairs.

Apply, GEORGE WILSON, FOLESHILL ROAD, COVENTRY.

WANTED, immediately, capable Man as MAIN and SERVICE LAYER, SMITH, &c.

Apply, stating Age, Experience, and Wages required, to the MANAGER, Gas-Works, BODMIN.

FLEETWOOD GAS COMPANY.

STOKER Wanted. Must be Experienced in Shovel Charging. Wages £4 6s. 6d. per week.

Apply to the MANAGER.

APPOINTMENTS, &c., WANTED.

EX-OFFICER, recently Demobilized, DESIRES POSITION in Gas-Works, Home or Abroad. Good Training in Large Works in North. Excellent Testimonials.

Address No. 6809, care of Mr. KING, 11, Bolt Court, FLEET STREET, E.C. 4.

PLANT, &c., FOR SALE & WANTED.

TO Gas and Electricity Works.—You cannot Complete your Works without using CHARKHAM'S Chemically Cleaned, Washed, Sterilized, and Calendered MACHINERY WIPING MATERIAL—no Wrinkles. Packed in ½ cwt. pressed bales at 68s. per cwt.; ¼ cwt. Sample sent Carriage Paid to any Districts on receipt of your Cheque for 30s. Provincial Inquiries invited. The Wipers are famous for cleanliness. Send us your orders and we will do the rest.

J. CHARKHAM, Arthur Street, ALDERSHOT.
Telephone Aldershot 60.

MACHINE TOOLS for Immediate Delivery—

6—No. 9 Herbert TURRET LATHES. All-Geared head, 3½ in. hole through Spindle (without Cross-slides). Excellent Condition.
1—1¾ in. capacity Foster TURRET LATHE, Bar Feed, Cut-Off Rest, Pump.
1—New 1½ in. Capacity Foster CAPSTAN LATHE, 8½ in. Centres, Bar Feed, Cut-off Rest, Pump.
1—10½ in. by 10 ft. Straight Bed S.S.S. and Screw Cutting LATHE by Dean Smith and Grace, Pump, Chuck. Very Good Condition.
3—12 in. by 14 ft. Straight Bed Sliding and Surfacing LATHES by Stirk, Double Back Geared. Good Condition.
1—New 8½ in. by 8 ft. Gap Bed S.S.S. and Screw Cutting LATHE, Pump, and 14 in. "British Bulldog" Chuck.
3—New 9½ in. by 8 ft. Straight Bed S.S.S. and Screw Cutting LATHE, Pump and Chuck.
1—New 9½ in. Gap Bed S.S.S. and Screw Cutting LATHE, Pump and Chuck.
4—5½ in. by 5 ft. Straight Bed S.S.S. and Screw Cutting LATHES, Back Geared, with Chucks, Steady Four-Way Tool Box. Good Condition.
1—18 in. Stroke by 10 ft. 6 in. Bed Traversing Head Double-Headed SHAPING MACHINE, Two Tables, by Wilkinson. Scarcely used at all.
2—New 14 in. stroke SHAPING MACHINES.
1—New Ring GRINDER with 8½ in. Magnetic Chuck.
1—Rochford BENCH MILLER. Good Condition.

COLUMN DRILLS, TOOL SHARPENERS, CUTTER GRINDERS, BACKING-OFF ATTACHMENTS, CHUCKS, VICES, HACKSAW BLADES.

THE JUDSON-JACKSON COMPANY, LTD., 50, MARSHAM STREET, WESTMINSTER, LONDON, S.W. 1.

GASHOLDER, 18 ft. diam. by 10 ft. deep, together with STEEL TANK, for Sale in Good Condition. Would sell separately if desired.

FIRTH BLAKELEY, SONS, & CO., LTD., CHURCH FENTON, *via* LEEDS.

FOR SALE.—Opal Shades, Eighteen 11½ in. Fourteen 9½ in.

Offers to R., 23, ROCKMOUNT ROAD, UPPER NORWOOD, S.E. 19.

WANTED, by Trustees of Late Mr J. Armitage Drake, return of Vol. II. "CHEMICAL TECHNOLOGY," edited by Groves and Thorp (Brown Cloth Binding), lent to some person unknown, or to Purchase another copy to Complete the Set.

State condition and price to DRAKES LIMITED, HALIFAX.

COMPANY NOTICES.

HORNSEY GAS COMPANY.

NOTICE is Hereby Given that the TRANSFER BOOKS of this Company relating to DEBENTURE STOCK only WILL BE CLOSED on the 17th inst. and REOPENED on the 1st of January, 1920.

By order of the Board,
WILLIAM E. ROBERTS, Secretary.

Secretary's Office,
Gas-Works, Hornsey, N. 8.
Dec. 9, 1919.

BARNET DISTRICT GAS AND WATER COMPANY.

NOTICE is Hereby Given that the TRANSFER BOOKS of this Company, RELATING TO DEBENTURE STOCK ONLY, WILL BE CLOSED on the 24th of December, 1919, and REOPENED on the 1st of January, 1920.

By order of the Board,
ERNEST W. DREW, Secretary.

139, Cannon Street, E.C. 4.
Dec. 8, 1919.

STOCKS AND SHARES.

New Issue of Capital.

LEA BRIDGE DISTRICT GAS COMPANY.

£20,000 SIX PER CENT. REDEEMABLE DEBENTURE STOCK

to be redeemed at Par in Ten Years—viz., on the 31st of December, 1929.

The Interest on the Debenture Stock (including the present issue) requires £2995 per Annum. This is a first charge on the Net Revenue of the Company which for the Twelve Months ended June 30 last was £17,706. The Interest therefore is thoroughly well secured.

The Reserve and other Accumulated Funds amount to £27,615.

MESSRS. A. & W. RICHARDS (William Richards) are Instructed by the Directors to ISSUE the above STOCK by AUCTION, at the Cannon Street Hotel, London, E.C., on Tuesday, Dec. 16, at Two o'clock, in Lots.

Particulars of the AUCTIONEERS, 37, WALBROOK, E.C. 4.

SALES BY AUCTION OF GAS AND WATER STOCKS AND SHARES.

MESSRS. A. & W. RICHARDS beg to notify that they hold PERIODICAL SALES BY AUCTION of NEW CAPITAL ISSUED UNDER PARLIAMENTARY POWERS, and of STOCKS and SHARES belonging to EXECUTORS and other PRIVATE OWNERS in LONDON, SUBURBAN, and PROVINCIAL GAS and WATER COMPANIES.

Terms for Issuing New Capital, and also for including other Gas and Water Stocks and Shares in these Periodical Sales, will be forwarded on Application to Messrs. A. & W. RICHARDS, at 37, WALBROOK, E.C. 4.

SOLE MAKERS OF THE "CONTINENTAL" & COAL WASHER. WESTMINSTER, S.W.